THE POTENTIAL ROLE OF BEHAVIOURAL FLEXIBILITY IN DOGS AND DOG ADOPTERS IN THE SUCCESS OF SHELTER DOG REHOMING

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Statement of originality

I declare that no material contained in this thesis has been used in any other submission for an academic award at this or any other institution. I declare that this thesis is all my own original work, and to the best of my knowledge it contains no material previously published or written by another person, except where otherwise indicated.

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Abstract

Unwanted and homeless dogs are an international problem. However, the way in which the dog-owner relationship and the rehoming process itself are commonly conceptualised in relevant research seems to assume that this relationship is a static one; the fundamental characteristics of it being an intimate dynamic relationship have either largely not been considered or have been ignored. Because the dog-owner relationship is intrinsically dynamic, conflict within the relationship, stemming from the demands of the domestic environment, can be expected to arise at some point. Therefore, the ability to resolve conflict may be a very important characteristic; key to this is behavioural flexibility. This thesis hypothesises that the ability of a dog to effectively "fit in" to this environment is determined by its ability to cope with these demands, which may be predicted from their behavioural flexibility, so assessing it in dogs and potential adopters could be useful in the rehoming process. Rehoming practices currently being used by shelters were qualitatively analysed. Ten themes emerged from the types of information organisations gathered during the adopter screening process; 37 characteristics were identified as "most important"; 31 of those could lead an adopter being deemed unable to adopt a dog. Evidence was found in the academic literature to support the inclusion of 12 of these characteristics. Nine themes emerged from the types of information respondents gathered from pre-adoption dog screening assessments; within those themes, 71 sub-themes were created. Of those, 42 characteristics (sub-themes and one theme) were identified as being "most important", 28 of which could lead a dog to be deemed unadoptable. Evidence in the scientific literature to support the inclusion of the 71 sub-themes and one theme was found for eight of

them. Organisations invest considerable resources into screening dogs and potential adopters, but there seems to be little scientific rationale for this. To assess flexibility in humans, measures used to place human foster children into homes were adapted to be relevant to the dog-owner relationship, which were then administered to three samples: long-term dog owners, dog relinquishers, and dog adopters. One of the measures was unreliable and unable to distinguish between the long-term dog owner and relinquisher populations. The other measure contained six reliable items, which were able to mathematically separate long-term dog owners from dog relinquishers. These results suggest that long-term dog owners are more flexible than relinquishers in some areas of their expectations of dog behaviour, namely of a dog's ability to adapt. A testing battery was created to understand in what ways two dog populations (those that are currently in a shelter and long-term owned dogs) differ in terms of their flexibility, based on six factors hypothesised to comprise behavioural flexibility in dogs. The two populations of dogs were tested using two testing means (i.e. by the principal investigator and by a citizen science approach). Two potential confounds, dog weight and testing means, were found to be associated with test outcomes for one entire test and several items on other tests. Four total items from the remaining three tests were used together to attempt to classify dogs into the correct population. Only two items from one test were able to classify dogs into the correct population, but they were unable to classify the origins of the long-term owned dogs, so it was determined that for the purposes of this research all tests were unreliable. Consequently, dogs who had remained in homes could not be compared with shelter dogs. Despite this, the results raise important considerations for dog assessments generally. The role of dog weight has not been considered as a potential confound in dog assessments, but it may be that dogs of different sizes are

fundamentally experiencing the world differently; thus, the same testing protocol may not be appropriate for all dogs. Similarly, it should not necessarily be assumed data collected via a citizen science approach can be combined with data collected by trained investigators.

Behavioural flexibility may be an important aspect of the dog-owner relationship, due to its close personal nature, coupled with all of the varied demands that a dog faces in a home environment. However, evidence suggests that future research should primarily focus on investigating flexibility in humans, as it is ultimately the owner who decides to terminate the relationship and relinquish the dog, and this is the area that yielded the most encouraging results in this thesis. There are two key additional foci for future research: longitudinal research to follow dogs from arrival at the shelter until at least one year post-adoption in order to determine what practices and policies pre-adoption are most beneficial to the success of the placement, and the development of a validated tool to assess dogs' quality of life, which could be used to assess the success of the placement from the dog's perspective.

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Chapter 1

1.1. The problem of abandoned and rescued dogs

Unwanted or homeless dogs are an international problem affecting many countries around the world (Patronek, Glickman, Beck, McCabe, & Ecker, 1996; Scarlett, Salman, New, & Kass, 1999; Vučinić et al., 2009). The World Health Organization estimates that there are 200 million stray dogs worldwide (Oxford Pets, 2020). In the UK alone, an estimated 81,050 stray dogs were handled by local authorities in the one-year period between 1 April 2015 and 31 March 2016, 22% of which were passed on to animal welfare organisations for rehoming (GfK Social Research, 2016). In a one-year analysis of three animal shelters in metropolitan Melbourne, Australia between June 2001 and October 2002 a total of 20,729 dogs were admitted: 83.8% were strays and 15.1% were owner relinquished (Marston, Bennett, & Coleman, 2005). In total, the RSPCA in Australia admitted 44,770 dogs in a one-year period between 2016 and 2017 ("RSPCA Australia National Statistics 2016-2017", n.d.). In the US the ASPCA (2015) estimates 3.9 million dogs per year enter shelters nationally, and 1.2 million dogs in shelters are euthanized. In a three-month analysis of 186 shelters and animal control agencies in 42 states in 1998, 386,992 dogs were handled, 53% of which were stray and 43% of which were owner relinquished; of the total number of dogs handled, 52% were euthanized, and 35% of those euthanized were due to insufficient space (Wenstrup & Dowidchuk, 1999). The fate of dogs entering shelters varies based on several factors (e.g. local laws and ordinances, resources, dogs' health and behavioural histories), but for the majority there is one of three outcomes: reclaimed by owner, rehomed/transferred

to a rehoming organisation, or euthanized ("RSPCA Australia National Statistics 2016-2017", n.d.; Vučinić et al., 2009; Wenstrup & Dowidchuk, 1999).

Unfortunately, there is no reliable information on the numbers of stray or homeless dogs in many countries, such as India and Brazil, so the countries for which there are estimates likely only represent a small proportion of the worldwide figure (Otranto et al., 2017). Dogs' varying roles in societies and cultural differences in views of dog ownership may also contribute to the lack of reliable worldwide data. This is the case in many developing countries (Jackman & Rowan, 2007). Moreover, academic research focusing on shelter dogs tends to be conducted in Western countries, namely the US, UK, and Australia, and a limited number of studies are conducted elsewhere, which may further contribute to the lack of data for many countries.

The "no kill" movement has grown internationally over recent years and is continuing to do so (Irvine, 2017). In the US, the movement became mainstream in 1994 with the creation of Maddie's Fund, an organisation focused on dramatically improving the well-being of companion animals by making this movement mainstream (Arluke, 2003). Maddie's Fund defines a no-kill shelter, city, community, or a nation as, "*a place where all healthy and treatable animals are saved and where only unhealthy & untreatable animals are euthanized*" (Avanzino, 2003). The movement in general is controversial, but nonetheless it remains popular and is supported by large animal welfare organisations in the US, such as the ASCPA and the Humane Society of the United States, as well as by smaller rehoming organisations (Peterson, 2018). Many cities that have adopted this movement or are working toward it have had notable decreases in the numbers of sheltered animals euthanized; for example, in Los Angeles, California the

percentage of dogs *not* euthanized has increased from 71.3% in 2011 to 93.36% in 2018 ("About NKLA", n.d.). However, in doing so, additional resources are needed in shelters to house and care for the dogs until they are rehomed, which in some cases can take a considerable amount of time (Cafazzo et al., 2014; Hawes, Ikizler, Loughney, Tedeschi, & Morris, 2017). The movement is also widespread in the UK, with a number of no-kill rehoming organisations and animal shelters throughout the country (No Kill Network, 2020). The Scottish SPCA maintains a policy that states that it *"does not put healthy animals to sleep"* (Scottish SPCA, 2017). Dogs Trust, one of the UK's largest rehoming organisations, states in its constitution that, "…*no mentally and physically healthy dog taken into the protection of the rescue/re-homing centres shall be destroyed*." (Dogs Trust, n.d. a). There is very limited academic research that has investigated the impact of organisations' "no kill" policies in any country, and there are numerous aspects to consider (e.g. changes in organisations' daily operating procedures, space issues in facilities, associated costs), but perhaps the most important are the long-term effects on overall dog welfare. In an analysis of the impact of the "no kill" movement in Austin, Texas, which is regarded as a "no kill city", Hawes et al. (2017) reported that in a random sample of dogs at a local rescue organisation, 22/145 (15.2%) were in the organisation's care for >360 days, and it is likely that at least some of these dogs would have been euthanized prior to the implementation of the "no kill" resolution. However, in keeping with the lack of research previously noted, the authors highlighted that additional data is needed on these "long-stay" dogs to assess their health and quality of life.

While neither the US nor the UK have national regulations regarding "no kill" policies, some countries do. Italy enacted a law in 1991 prohibiting euthanasia

for sheltered animals that do not meet specific criteria (Cafazzo et al., 2014). Because of such a law in Italy, the number of dogs living in shelters each year surpasses the number of adoptions (Mondelli et al., 2004). Although not all dogs that are part of "no kill" organisations, cities, or countries are kept in kennels, and even with limited research on the impacts of these policies, it would seem that being rehomed sooner rather than later is advantageous in most, if not all, respects. As such, the "no kill" movement, in addition to shelter and rehoming organisations' already limited resources, have contributed to an increased need for organisations to improve rehoming rates and successful placements.

1.2. How rehoming organisations try to improve rehoming rates and successes

There are a number of ways rehoming organisations attempt to maximize the number of dogs they rehome and to improve the likelihood of successful placements, but one key component is conducting pre-adoption dog assessments. Organisations undertake such assessments for two main purposes: to reduce liability and to improve prospects of a successful rehoming. A third reason why some organisations conduct assessments, which is being increasingly recognised, is to identify which dogs require additional training or rehabilitation prior to rehoming (Mornement, Coleman, Toukhsati, & Bennett, 2010). There is potentially an additional key reason for conducting such assessments: an attempt to ensure good welfare and quality of life for the dog in their new home. In the second case, to improve prospects of a successful rehoming, organisations tend to focus on trying to get some form of match between adopter and dog with the hope that it will lead to a successful placement. For the dog this is often done by gathering as much information as possible during a behaviour assessment (e.g. behaviour around small children, behaviour around other dogs, and behaviour around food) (Christensen,

Scarlett, Campagna, & Houpt, 2007; Marder, Shabelansky, Patronek, Dowling-Guyer, & D'Arpino, 2013; Mornement et al., 2010) or from surrendering owner reports (e.g. has lived with children previously) (Posage, Bartlett, & Thomas, 1998). For the adopter this is often done by asking specific questions during the screening process about their lifestyle and what characteristics they want in a dog (e.g. do you want your dog to be playful, when did you last have a dog) (ASPCA, 2010, 2012; Weiss, Gramann, Dolan, Scotto, & Slater, 2014). Armed with such information about the dog and potential adopter, organisations then attempt to find a good match for each party. The formality and standardisation by which organisations conduct the information collecting and matching processes can vary widely.

One of the more structured matching processes is the ASPCA's Meet Your Match™ Canine-ality™ adoption program, which aims to successfully match dogs with potential adopters by evaluating five aspects of a dog's behaviour (friendliness and sociability, playfulness, energy level and ability to focus, motivation, and "people manners") (ASPCA, 2010, 2012). Potential adopters also complete a survey corresponding to what is evaluated in the dog assessment; they are then classified into one of three groups and assigned a colour. Adopters in the green category "*are most successful with dogs who like to be physically and mentally engaged*". Adopters in the orange category "*are a good fit with middle-of-the-road dogs who are responsive and like regular activity and interaction*". Adopters in the purple category "*are comfortable with dogs who have a laidback attitude and enjoy an easygoing lifestyle*" (ASPCA, 2012). The colour categories to which dogs are assigned are purportedly based on their assessment score and on the evaluator's determination of a dog's source of motivation (internal, external, or social) during the assessment (ASPCA, 2012). Within each colour category they are divided a

further three times so that each one has a Canine-ality™ name and description. When a potential adopter is seeking a dog, they find one that has a matching colour to their own, the assumption being that the dogs coded with the same colour will be a good fit based on what their lifestyle is and what characteristics they would prefer in a dog (ASPCA, 2012).

1.3. A critique of current approaches

It is understandable that shelters and rehoming organisations have traditionally focused on using pre-adoption assessments of both dogs and potential adopters to find a well-suited match between them. There may be some usefulness in conducting a matching process between dog and owner for the sake of the success of the placement, but the relationship between the matching process used and the success of the placement is not an aspect of dog rehoming that has received much research attention. The ASPCA does report that the implementation of their Meet Your Match™ Canine-ality™ adoption program at various rehoming organisations in the US has led to an 14% - 35% increase in adoptions, and a 1% - 50% decrease in dog returns, but this is as reported on their website, not in academic literature, so it is not possible to know how reliable or accurate this information is (ASPCA, 2020). Moreoever, the ASPCA's program could be considered a more progressive matching program, so even less is known about the usefulness of even more traditional matching methods.

Aside from the lack of research investigating the efficacy of these types of matching procedures, there is concern regarding what underpins the nature of them. The way in which the dog-owner relationship and the rehoming process itself are commonly conceptualised has been narrow in focus and scope (e.g. Topál, Miklósi, Csányi, & Dóka, 1998; Weiss, Miller, Mohan-Gibbons, & Vela, 2012), and

traditional matching approaches have mirrored this. This seems to reflect an assumption that relationships are static or at least stable, and the associated research has approached the subject in a similar way (e.g. Marston et al., 2005; Prato Previde, Custance, Spiezzo, & Sabatini, 2003), i.e. what is true today about the needs and wants of the owner or dog will be true tomorrow and for a long time to come. However, a fundamental characteristic of close personal relationships (which is typical of that which develops between a dog and its owner [Topál et al., 1998]) is that they are sensitive and responsive (Heard & Lake, 1986), and the dynamism that inevitably results has either largely not been considered or been ignored/overlooked. For example, in the case of the human (i.e. potential adopter), the factors that are often considered tend to revolve around lifestyle and environment (e.g. family composition, housing, employment, and so on) (ASPCA, 2012; King, 2010), but the tendency for these factors to change during the lifetime of the dog is often not considered. Consequently, there are several potential problems with this traditional matching approach. First of all, because a potential adopter's circumstances are likely to change, what may be suitable at one time may change, so even if the measures to assess dogs are valid and reliable, which many of them are not (e.g. Bennett, Litster, Weng, Walker, & Luescher, 2012; Christensen et al., 2007; Marder et al., 2013; Poulsen, Lisle, & Phillips, 2009), then the goal of successfully matching based on such factors may not be achieved. Additionally, surrendering owner reports are not necessarily predictive of how a dog will behave and cope in a new home environment (Stephen & Ledger, 2007). There is no academic literature on the validity or reliability of adopter screening tools to date that could be sourced. Second, even if certain factors, which are recognised risk factors for relinquishment, do not change (e.g. family composition and housing), relationships are intrinsically

dynamic and opportunities for conflict within the relationship can be expected to arise at some point (e.g. a puppy turns into adult, an adopter's life circumstances change, an adopter's ability to tolerate declines). Some of these changes are recognised risk factors for relinquishment (New et al., 2000; Patronek et al., 1996), and King (2010) reports that the most common reason provided by owners for a failed adoption was a change in owner circumstances. Shelters and rehoming organisations may tend to focus so heavily on static features of the potential adopter because they believe that such things relate to the welfare of the dog or the likelihood that the dog will remain in the home, or perhaps they are aiming to gain as clear of a picture of the potential adopter as possible, but still these sorts of factors only reflect a snapshot in time. While some changes in adopter circumstances can be known in advance (e.g. expecting a baby), which a more traditional adopter screening process may be able to flag by the types of information they gather, many changes in circumstances cannot be predicted or will occur at a much later time. A traditional screening process would not be able to address these types of changes.

"Conflict" is a broad term; in the field of psychology it refers to, "*any situation in which there are mutually antagonistic events, motives, purposes, behaviour, impulses, etc.*" (Reber & Reber, 2001). Conflict as a phenomenon exists in myriad contexts, transcending time, culture, species, etc. However, what unifies all conflict is that without some form of resolution, peace cannot be achieved. The issue of tolerance is key to highlight and of particular relevance. Certain aspects of a dog, such as behavioural issues, may not be bothersome or negatively affect the dog-owner relationship initially or for some time, but eventually, and especially if the frequency of the problematic behaviour increases, a breakdown in the

relationship can occur, which may lead to the dog being relinquished (New et al., 2000; Patronek et al., 1996). Therefore, the ability to resolve conflict may be a very important characteristic, which the current thesis will refer to as one's "conflict resolution potential". The current thesis theorises that key to this is behavioural flexibility, which is fundamental to resolving conflict (Bergmüller & Taborsky, 2010); it is not always necessary for both parties to be behaviourally flexible as a relationship could survive, in some circumstances, if one party is able to sufficiently tolerate or accommodate the other. A resolved conflict does not necessarily mean that the issue at the root of the conflict entirely goes away; it may be more a matter of mitigating it or determining that one is able to live with it, or avoiding it altogether, but this may result in prolonged stress. There are varying types of conflict in the dog-owner relationship, which stem from the social and physical demands of the domestic environment. For example, a dog that displays excessive vocalisation when left home alone may not be problematic if they live in a rural setting, but if they live in an apartment building in an urban setting, such vocalisations may be incompatible with the environment, thus causing conflict, which may lead to the dog's relinquishment (Stephen & Ledger, 2007). The physical and social demands are not believed to be the same for every case, but together, they are aspects of a "niche", which Miklósi (2011) describes in this context as, "*the psychological and social environment of humans that is shared to some extent or has some overlaps with dogs*".

The current research hypothesises that the ability of a dog to effectively "fit in" to its domestic environment (i.e. a home) is determined by its ability to cope with the varied physical and social demands present within such an environment, which may be predicted from their behavioural flexibility. A successful

relationship, characterised by the ability to resolve conflict, is proposed to correlate with a lowered risk of the dog's relinquishment, which might be predicted as a function of the flexibility of both the owner and the dog. What is tolerable or acceptable to one owner (e.g. the frequency of a behaviour) may not be to another owner (New et al., 2000; Patronek et al., 1996), which is why flexibility may be important to the success of humans and dogs coexisting in the niche.

This theoretical approach is in stark contrast to traditional ones that seem to have largely focused on trying to develop predictive tests of behaviour, focusing on settings or experiences a dog is likely to encounter in a home environment (e.g. ASPCA, 2012; Diesel, Pfeiffer, & Brodbelt, 2008; Mornement et al., 2010; Rayment, De Groef, Peters, & Marston, 2015). As previously noted, the two primary purposes of tests are risk assessment and the gathering of information to aid in the rehoming process (Mornement et al., 2010), but in both cases this is largely accomplished by recording the responses of dogs to a variety of stimuli, and often for the purpose of risk assessment it involves provocation of the dog. For these tests to be valid it must be assumed that a dog's behaviour during a test provides reliable insight into future behaviour in both similar and other contexts (Rayment et al., 2015). Thus, it seems it is assumed that testing outcomes are inherently both generalizable and predictive. One common component in many assessments is the use of proxies (e.g. a rubber hand on a stick, a toddler-sized doll) to theoretically assess a dog's reactions to experiences such as having their food touched or being bothered during mealtime, or being in the presence of a young child (e.g. Dowling-Guyer, Marder, & D'Arpino, 2011; Marder et al., 2013). The use of proxies in assessments has received a notable amount of research attention with diverse conclusions concerning their usefulness: dogs may react differently to a rubber

hand touching their bodies and their food compared to how they would if it were an actual human hand (Tempany & Mills, 2008), so it is possible that dogs labelled as food aggressive in an assessment display behaviours that are not related to what would be classified as food aggression in a home setting. Barnard, Siracusa, Reisner, Valsecchi, and Serpell (2012) report that a child-like doll is a useful tool for screening for social fears in unknown dogs to identify dogs who should not be adopted to families with small children or should receive extra supervision; however, the authors note that results from assessments using a doll should not solely determine the fate of the dog (e.g. adoption versus euthanasia). Aside from the methods by which traditional assessments aim to gain information, there is a more fundamental issue of concern: the terminology that is used in relation to what such assessments are believed to be measuring. The terms "behaviour", "personality", and "temperament" are all commonly used by organisations to describe the assessments used in the pre-adoption screening process. Often the terms are used interchangeably, which may be due to an underlying knowledge deficit in the definitions of these terms and constructs, when in fact they have separate meanings (Rayment et al., 2015). Such an erroneous interchangeable usage of these terms further muddles both what assessments are believed to be assessing, as well as what they are actually assessing.

There is ambiguity in the usage of these terms both in the context of dogs and humans. In human psychology, "behaviour" is defined as, "*a generic term covering acts, activities, responses, reactions, movements, processes, operations…in short, any measurable response of an organism*" (Reber & Reber, 2001). There seems to be particular overlap in usage and definitions of "personality" and "temperament". "Personality" is very broadly used in the literature and is often an

umbrella term, and thus is challenging to provide a concise definition for (Reber & Reber, 2001), but for the purpose of differentiating it from the other two terms, it refers to, "*an individual's characteristic pattern of thinking, feeling, and acting*" (Myers, 2001). "Temperament" can be defined as, "*a person's characteristic emotional reactivity and intensity*" (Myers, 2001). As the terms pertain to dogs, the definition of "behaviour" is broad in scope,

> "*In its simplest form…a series of muscle contractions, perhaps performed in clear response to a specific stimulus, such as in the case of a reflex...in the other extreme…very complex activities, such as a pack of wolves seizing a prey"* (Jensen, 2011).

"Personality" refers to, "*biologically based behavioural predispositions that contribute to the definition of a relative stable but individually distinct phenotype*" (Mills, Braem Dube, & Zulch, 2013). "Temperament" is defined as, "*the affective style, which is typically shaped by the effects of both genetic predisposition and early experience on motivational-emotional systems*" (Mills et al., 2013).

In terms of practical application, the traditional assessments that organisations use tend to fall into one of three categories:

- those that are well established and may be used by multiple organisations (e.g. ASPCA's Meet Your Match™ and Match-Up Behavior Evaluation);
- those that are developed by organisations in-house, and
- those that are *based* on established ones (ASPCA, 2010, 2012; Dowling-Guyer et al., 2011; Mornement et al., 2010).

However, it should be noted that referring to an assessment as *well established* does not imply that is necessarily valid or reliable, but rather it refers to being consistently used and having factors such as having a formalised testing

protocol, trained assessors, or trademarking of the protocol. In the third case, organisations may learn about an established assessment online, such as those in the first category, but not receive any formal training in conducting the assessments, and they may also make changes or adaptations to it, all of which can affect any established validity, so this could be the most detrimental scenario (Mornement et al., 2010).

Aside from all of the shortcomings of traditional assessments (e.g. validity, reliability, issues with terminology), which have garnered much research attention, there is the question of whether the types of information they are aiming to gather are actually important to both improving the chances that a dog will be rehomed and the success of the placement if they are. A dog's appearance has been reported to be a key factor in whether the dog is rehomed. Lepper, Kass, and Hart (2002) report that lap dogs are statistically more likely to be adopted (OR 3.86, 95% CI: 2.45-6.08). Weiss et al. (2012) report that when asked in an open-ended format why they chose their dog, adopters reported that appearance was the single most important factor in their decision. Marder et al. (2013) investigated the relationship between dogs who were labelled as food aggressive in a pre-adoption behavioural assessment and whether they were reported as food aggressive by their new owners post-adoption. The study reports a significant association between the presence of food aggressive behaviours in dogs pre-adoption and the presence of those reported by owners post-adoption. However, what is possibly the most interesting and useful finding from this study was a disparity between behaviours dogs were exhibiting that would be classified as food aggressive and the owners' perceptions of such behaviours (i.e. they were often not classifying their dog as food aggressive even with the presence of such behaviours). Moreover, the study reports that adopters did

not consider food aggression to be a significant problem. These issues highlight further the value of a shift away from the traditional emphasis given to dog behaviour assessments.

1.4. An alternative approach

The human-animal bond, and specifically the human-companion animal bond, is widely documented and researched (e.g. Beck, 2014; Serpell, 2015). The practice of pet keeping transcends myriad cultures and societies and can be traced back in history for thousands of years (Serpell, 2015). The strength of the bond between people and their pets can be evidenced by the type and level of attachment people form with them (Beck & Madresh, 2008). The nature of attachments between people and their pets also provides evidence of the similarities between human-to-human relationships and human-to-dog relationships. Similarities between the two relationships can be found in several other aspects, such as the way in which people relate to or describe their dogs (e.g. a member of the family), dogs as social support, and the amount of resources people invest in their dogs (McNicholas & Collis, 2006; Serpell, 2015). Therefore, the two relationships can also potentially be conceptualised in similar manners.

There are several parallels between the nature of the human foster child-foster parent relationship and the rescue dog-owner relationship. One is the relative potential for both types of interpersonal relationship to be dissolved in similar ways if there is a breakdown within them. The problem of considering this dynamic and evolving relationship as a static feature has been highlighted and critiqued as it pertains to human foster child placements,

> "*Because we are living systems, each of us changes every day and our relationships are also dynamic and changing…The traditional assessment*

process can be seen as an attempt to freeze time, as if a finite decision can be made that could be right for all future time" (Ryburn, 1991).

Therefore, it might be valuable to examine what has happened in this field in relation to flexibility and the placement of human foster children into families that could be borrowed (Doelling & Johnson, 1990; Green, Braley, & Kisor, 1996; Street & Davies, 1999). Flexibility is thought to be important to the success of the human foster child-parent relationship, the research of which is underpinned by theory and research on temperament in humans (Thomas & Chess, 1977; Windle, 1989; Windle & Lerner, 1986).

Windle and Lerner (1986) updated the Dimensions of Temperament Survey, an existing measure of temperament in humans across the lifespan, to create the Revised Dimensions of Temperament Survey (DOTS-R). The measures are based on the authors' conceptualisation of temperament as the "*characteristic behavioral style that individuals manifest*"[1], which includes stylistic patterns of adjustment to changes in one's environment, which can be conceptualised in terms of flexibility. The authors posit that while the actual behaviours or behavioural acts that one displays vary at different developmental stages, it is still possible to characterise the temperamental styles similarly. The Dimensions of Temperament Survey and the DOTS-R were designed to identify these behavioural styles (i.e. temperament) at various age levels. Two of the dimensions, the Approach-withdrawal dimension and the Flexibility-rigidity dimension, were originally grouped together as one dimension in the Dimensions of Temperament Survey (DOTS), but following factor analyses in the revision process of the measure, they emerged as two separate dimensions in the DOTS-R. Windle (1989) investigated the concurrent validity of

[1] The studies reviewed in this section all use this definition of temperament.

the DOTS-R attributes by comparing them with the factors of two well-established personality/temperament inventories (the Emotionality, Activity, Sociability, Impulsivity temperament measure and Eysenck's Personality Inventory). The study reports evidence (i.e. moderate to high correlations) for the concurrent validity of DOTS-R attributes in relation to the traits of the two other measures.

Doelling and Johnson (1990) used an interactive "goodness-of-fit" model, which considers characteristics of both the foster child and the foster parent in the placement of that child. The study examined whether, or the extent to which, a mismatch in foster parent-foster child temperament might be predictive of the placement outcome. The authors hypothesised that a mismatch between a difficult child and an unadaptive foster parent would be most predictive of a poor placement outcome. Traditional models of placing foster children into families often considered the characteristics of each party separately (as occurs with dogs). The "goodness-of-fit" model, proposed by Thomas and Chess (1977), stresses the significance of parental response to a child's temperament-related behaviour; that response "*…mediates the relationship between temperament and the development of problem behaviors in children*" (Doelling & Johnson, 1990). Using a sample of foster children and mothers (n=51), three versions of the DOTS-R (the DOTS-R Adult, the DOTS-R Child, and the DOTS-R Child Expectations) were administered to investigate the relationship. To assess the interaction between parent-child variables, children were categorized as "easy" or "difficult" on each DOTS-R temperament dimension; mothers were categorized in the same manner on the Flexibility-rigidity and Approach-withdrawal dimensions. A "mismatch" in mother-child temperament was labelled as such if both parties were "difficult" on that pair of dimensions; a "match" was labelled as such if one or both were "easy" on that

pair of dimensions. A mismatch of an inflexible mother and a negative mood child was predictive of poorer placement. Because dogs housed in shelters are often stressed (Hennessy, Davis, Williams, Mellot, & Douglas, 1997), they may be negative mood as well. Assessing mood in non-human animals can be challenging, as they are non-verbal (Raoult & Gygax, 2019). However, it has been investigated in some species, such as chimpanzees and donkeys (Bateson & Nettle, 2015; Minero et al., 2016), as well as in dogs (e.g. Kuhne, Hößler, & Struwe, 2012; Mendl et al., 2010; Wells, Hepper, Milligan, & Barnard, 2017). Additionally, studies have reported a relationship between stress and negative mood in humans (e.g. Hamidovic, Childs, Conrad, King, & de Wit, 2010; Lieberman, Tharion, Shukitt-Hale, Speckman, & Tulley, 2002; van Eck, Nicolson, & Berkhof, 1998), so a similar relationship may exist for dogs.

Green et al. (1996) expanded on the Doelling and Johnson (1990) study by also evaluating the role of temperament in foster fathers in their sample and by using only adolescent foster children. They evaluated the notion that foster child placements would be more successful when the temperaments of the parents were matched in a particular way with that of their foster children. The DOTS-R was administered to a sample of families with a foster child (n=40) to assess temperament; the child and the parents each completed the survey. Two additional measures were used to assess the perceived quality of the matches and to evaluate family adjustment. The authors hypothesised that “mismatched” parent-child dyads (i.e. rigid parents and/or parents with negative moods with rigid and/or negative mood children) would have poorer family or foster care adjustment than better matched dyads (i.e. flexible and/or positive mood parents with children who score anywhere on these scales). These are goodness-of-fit hypotheses, which focus on

"*the congruence of childhood temperaments with parental environments*". The study reports that when "easy" children were matched with "easy" mothers and fathers (as defined in the context of the study), the parents reported higher levels of family functioning and better foster care adjustment. For mothers the most favourable combination was when flexible mothers were paired with positive mood adolescents. If the same principle applies to the placement of dogs, it is predicted that flexible owners will be most successful with positive mood dogs, but it is also possible that an "easy" dog is a flexible one, and thus flexibility in both owners and dogs is integral to the success of the relationship.

Another parallel that can be drawn between the dog-owner and human foster child-foster parent relationships is the role of expectations in each relationship and how they can affect the outcome of the relationship. Inappropriate owner expectations of the work involved in caring for a dog is a risk factor for relinquishment (Patronek et al., 1996), as are owners' unrealistic expectations stemming from knowledge deficits of dog behaviour (New et al., 2000). In the aforementioned study of Doelling & Johnson (1990) goodness-of-fit was also examined in terms of mothers' expectations of child temperament and the child's actual temperament characteristics. Matches were categorized as children whose temperament characteristics met or exceeded mothers' expectations; mismatches were labelled as such when the child's temperament did not meet mothers' expectations. The study reported that a mismatch of a child of a more negative mood than expected was predictive of poorer placement outcome. The authors hypothesised that mothers may find less predictable children to be more difficult and may be less satisfied with them. This is perhaps not surprising in the context of a

human foster child-foster parent relationship, but it does reiterate what a central role one's expectations can have in the success of a relationship.

Street and Davies (1999) also propose an interactional model of placing human foster children with foster families, which begins with the concept of matching a foster child to a parent. As the authors note, the concept of matching "*…implies that the child and the foster carer will both naturally bring something to the establishment of a relationship that will allow for that relationship to develop in the long term*", which is in line with the dynamic nature of all relationships as discussed in the previous section. The interactional model proposed in this latter study accepts that both the child and the parent are contributors to the relationship, and it considers the foster care situation from both of their perspectives. As noted by the authors,

> "*The foster carers require a child who is going to mesh with them, their family and their natural behaviour in such a way that they can deal with the child in a relaxed fashion. The ways in which the child develops and behaves should correspond with the carers' expectations of child development and the growth of the parental relationship*."

The interactive model proposed by the authors focuses on describing children's behaviour in a functional manner (a day-to-day interactive style), and then does the same with the potential foster parent's reciprocal behaviour, which would together illustrate possible interactive patterns. The authors suggest that by appreciating these interactive patterns it should be possible to predict the ways in which a child and potential foster parent may reciprocally match or not, and to construct an estimation as to how they may interact and the likely development of that interaction. This model does anticipate some consistency of the child in different

contexts, as it does with the adult with different children. Similar to the way in which a dog's ongoing behavioural issue could negatively affect the dog-owner relationship possibly leading to its breakdown (Patronek et al., 1996; New et al., 2000), which was discussed in the previous section, Street and Davies (1999) note that a child's behavioural problems can be very "costly" for some parents, especially if the behaviour does not change over time.

Whilst there are parallels between the dog-owner relationship and the human foster child-human foster parent relationship as previously discussed, a clarification of these terms, including similarities and differences in their definitions between dogs and human children is important. It is necessary to differentiate between fostering and adopting human children. Foster care for a human child is defined as, *"...a temporary service provided by States for children who cannot live with their families. Children in foster care may live with relatives or with unrelated foster parents.*" (Child Welfare Information Gateway, n.d.). Foster parents of a human foster child are defined as *"…people who officially take a child into their family for a period of time, without becoming the child's legal parents.*" ("Foster Parent", 2019). While there are some commonalities between fostering and adopting a human child, adoption is defined as,

> *"…the act by which an adult formally becomes the guardian of a child and incurs the rights and responsibilities of a parent. At the conclusion of the formal process, a legal relationship between child and guardian will have formed."* (Cornell Law School Legal Information Institute, n.d.).

The terms "fostering" and "adopting" are also applicable to dogs, and are used in much the same way as they are with human children. Fostering involves providing temporary homes for dogs that are in the care of shelters or rehoming organisations.

An organisation will usually provide necessary supplies for the dog (e.g. food, bedding) while in the foster home as well as cover the costs of veterinary care (Dogs Trust, n.d. b). Adopting a dog refers to taking responsibility of the dog, including associated costs and risks. It is typically assumed by all parties that this will be a permanent home for the dog, but this is often not the case, which is one of the cornerstones of the current thesis. If the dog owner decides to terminate the relationship, there are a number of options for what to do with the dog, such as returning them to the organisation from which they were adopted, relinquishing the dog to another organisation, or giving the dog directly to another person. There is a relative ease with which dog-owner relationship can be terminated, which is not the case with the adoption of human children, but as previously described, it is the case with the fostering of human children. It should be noted that a dog can be adopted at any age from young puppyhood when they are able to be safely separated from their biological mother or at the age when weaning would normally take place if they are not with their biological mother. This is not the case with the fostering of human children, which occurs during childhood until the child legally becomes an adult and "ages out"[2] of the foster care system (Find Law, 2018). For the purposes of this thesis, and as it is commonly referred to by both rehoming organisations and in the academic literature, adopting a dog refers to the process of rehoming from an organisation, as opposed to acquiring it from another means, such as a breeder or pet store. Dogs that are part of organisations and need to be rehomed may have been previously owned, such as if they were owner relinquished or seized as part of an animal cruelty situation, may have been found stray, or may have been born in the organisation.

[2] In the US, this typically occurs at age 18, but can vary by state (Find Law, 2018). In the UK, this occurs at age 21 (Children and Families Act 2014).

1.5. The structure of the current thesis

The current thesis hypothesises that the ability of a dog to effectively "fit in" to its domestic environment (i.e. a home) is determined by its ability to cope with the varied physical and social demands present within such an environment, which may be predicted from their behavioural flexibility (Kolb, 1990; Ragozzino, Detrick, & Kesner, 1999). However, prior to developing methods of assessing behavioural flexibility in owners and dogs, it is useful to investigate what current rehoming practices are being used by organisations, specifically regarding the pre-adoption screening process for potential adopters and dogs, to identify whether or not anything of relevance may be found there, and also to examine if there is any evidence of sound scientific practice. This is the focus of Chapters 2 and 3. Chapter 2 is a qualitative assessment of organisations' pre-adoption screening processes for potential adopters, and Chapter 3 is a qualitative assessment of organisations' pre-adoption dog screening processes.

Following this, potential tools for assessing flexibility in adopters and dogs can be developed and tested. This is the focus of Chapters 4 and 5. Chapter 4 is comprised of the development of questionnaire-type measures to theoretically assess behavioural flexibility in humans, as well as a tool to assess dog owners' satisfaction with their relationships with their dogs. This is followed by an analysis and comparison of levels of behavioural flexibility in two populations: long-term dog owners and dog relinquishers. Finally, a longitudinal analysis is undertaken with the measures to determine if they are able to predict the success of dog placements using a sample of dog adopters who completed the measures at the point of adoption. Chapter 5 is comprised of the development of a testing battery to theoretically assess aspects of behavioural flexibility in dogs in a dog rehoming context. This includes an assessment of the tests' reliability using samples of dogs

from two populations (i.e. long-term owned dogs and shelter dogs), and two means of test administration (i.e. by the principal investigator and via a citizen science approach).

Finally, Chapter 6 discusses the potential of the current research, and the approach developed within it, to improve the efficiency of the rehoming process to increase successful placements while decreasing resources expended by organisations to do so. The limitations of the current research will also be discussed. This is followed by the immediate and long-term directions future research in this specific trajectory should take, based on the findings of the studies that comprised this thesis, including question raised and gaps in the literature highlighted as a product of the studies' results. The chapter concludes with recommendations for what shelters and rehoming organisations should do in the meantime, based on the findings of this thesis, until necessary future research is conducted.

1.6. Key terms used in this thesis

Before proceeding, clarification of common terms used in the current research should be noted. Additionally, because participants were recruited from the US and the UK, vernacular from both countries is used throughout this research, particularly in the case of direct quotations. This also applies to terminology used in cited literature, depending on where the research was conducted.

The term "**shelter dogs**" has been used throughout to refer to any dog that is part of any type of animal control, shelter, or animal welfare/rehoming organisation. It is acknowledged that the breadth of such organisations is wide and can vary considerably in terms of several factors (e.g. municipal versus private, multiple branches versus single location, dogs housed in a dedicated facility versus individual

foster homes), but the investigation of potential effects of such differences in organisations is outside the scope of the current research.

The terms "**adopted dog**" and "**rehomed dog**" refer to any dog that has been acquired from a shelter, rehoming organisation, etc., rather than from another means, such as a pet store or breeder.

The term "**dog adopter**" refers to anybody who has acquired a dog from a shelter, rehoming organisation, etc., rather than from another means, such as a pet store or breeder.

The terms "**adopt**" and "**rehome**" both refer the act of acquiring a dog from a shelter, rehoming organisation, etc., and are used interchangeably throughout the thesis, although the latter tends to be used in the UK and not in the US.

The terms "**return**" and "**relinquishment**" of a dog are at times used in the literature interchangeably, and in some instances one is differentiated from the other on the basis of specific criteria (e.g. Shore, 2005). For the purposes of the current research, "relinquishment" will primarily be used as an umbrella term, but in some instances it may be used interchangeably with "return".

The term "**dog relinquisher**" refers to anybody who has voluntarily surrendered or given up their dog to another individual, party, or organisation.

The term "**personality**" is used as it was defined for humans and dogs in section 1.3; any exceptions to this, such as its usage in specific studies, are noted.

The term "**temperament**" is primarily used as it was conceptualised by Windle and Lerner (1986) (see section 1.4); any exceptions to this are noted.

Chapter 2

When rehoming a dog, organisations must consider not only the dog, but also the person who is looking to adopt the dog. Therefore, the aim of this chapter was to conduct a qualitative analysis of rehoming organisations' adopter screening processes in order to gain insight into what is being done, the extent to which this appears to have any scientific rationale, and what other factors might be driving the process. In order to do this, a written enquiry was sent to rehoming organisations in the UK. Information was received from 82 respondents. Pre-adoption home visits were the most commonly used screening method, and self-administered questionnaires were the most standardised method. Using a thematic analysis, ten themes emerged from the types of information organisations gathered during the screening process; 37 characteristics were identified as "most important", and 31 of those could lead an adopter being deemed unable to adopt a dog. Evidence was found in the academic literature to support the inclusion of the characteristics in assessments on the basis of three primary reasons associated with them: an increased risk for relinquishment, a dog's quality of life, and an increased risk to human safety. On the basis of these reasons, evidence was found for 12 of the characteristics. Organisations seem to invest considerable resources into screening potential adopters, but there seems to be little scientific, and in some cases logical, rationale for this. A further concern relates to the quality of the assessment processes, which show little evidence of any quality control measures. Until further necessary research is conducted, it could be argued that organisations should relax their strict screening criteria, and focus their resources on ensuring owners are fully

prepared for the changes in their life associated with the inclusion of a new dog in their home and supporting them as necessary.

2.1. Introduction

There has been a considerable focus in dog rehoming research on the development of dog assessment procedures prior to rehoming (e.g. Christensen et al., 2007; De Palma et al., 2005); with a growing recognition of the need to consider the quality (reliability and validity) of these procedures, as outlined by Taylor and Mills (2006) (e.g. Barnard et al., 2012; Diesel, Brodbelt, & Pfeifer, 2010; Shabelansky, Dowling-Guyer, Quist, D'Arpino, & McCobb, 2015). Another body of research has examined risk factors for relinquishment in terms of characteristics pertaining to both dogs and adopters. This line of research is often done either retrospectively by contacting surrendering owners after they have relinquished a dog, or by collecting data from surrendering owners at the point of relinquishment (e.g. Patronek et al., 1996; Scarlett et al., 1998; Shore, 2005). Such studies have been conducted in multiple countries and with various types of organisations (e.g. municipal shelters vs. private rehoming organisations). While it offers insight into what might lead a dog to be relinquished, retrospective research does have limitations. The lapsing of time and social desirability bias can make retrospective research unreliable, especially as the act of relinquishing a dog can be both emotionally charged and have a negative stigma attached to it (Furnham, 1986). Furthermore, as noted by Patronek et al. (1996), retrospective study designs in this field may struggle to establish causal relationships. There are exceptions to these reports, such as the prospective study of Diesel et al. (2008). Using a prospective cohort study design, they tracked the outcomes of a sample of dogs adopted from multiple rehoming centres over a one-year period. By following adopters for six

months post-adoption, the authors were able to mitigate the problematic nature of memory, and were better able to establish causal relationships. Several of their findings were in line with those previously reported in retrospective studies, such as behavioural problems being the most common reason for return (e.g. DiGiacomo, Arluke, & Patronek, 1998; Mondelli et al., 2004). Diesel et al. (2008) also reported a return rate of rehomed dogs of 14.7%, which is was similar to that reported by Marston, Bennett, and Coleman (2004) who reported a 15.1% return rate in three shelters in Australia. Diesel et al. (2008) did report that dogs rehomed to families with children <13 years old are statistically more likely to be unsuccessful adoptions, which had not previously been reported in other studies.

Understanding dog and human risk factors for relinquishment is important, and dog assessment is part of what determines if or by whom a dog is adopted; however, there are other important elements to consider, such as the methods, policies, and procedures employed by organisations to screen potential adopters seeking to rehome a dog. It is not known how or to what extent the scientific information available is being used in practice, or even what policies are in place and why. Ultimately these policy decisions can have as much impact as a failed test, but this important part of the process seems to have received much less research attention. As a starting point it is useful to employ qualitative methods to identify the culture that underpins the assessment of potential adopters, which is necessary to make the screening process more objective and effective in the long run. Therefore, the aim of this study was to conduct a qualitative analysis of rehoming organisations' adopter screening policies and procedures.

2.2. Methods

A list of dog rehoming organisations in the UK was compiled via the Association of Dogs and Cats Homes (ADCH) website (www.adch.org.uk). All organisations listed as full or associate members of the ADCH as of July 2012 were contacted electronically and/or via post. Electronic enquiries were sent via email and/or using the "direct contact form" on the organisations' websites. Organisations with multiple centres or branches were contacted individually where listed with separate addresses on their website. A total of 269 organisations and respective branches or centres from across the UK were contacted. This was comprised of 93 individual organisations, six of which had branches within the organisations, ranging from two to 96 branches. Head offices for four of the six multi-branch organisations were contacted in addition to each branch. The same written enquiry was sent electronically and by post. In the enquiry, organisations were asked about their policies and procedures employed to screen potential adopters (see Appendix A for full written enquiry):

1. "Do you have standardized questionnaires or criteria employed across the organisation for the adoption process, or do they vary from location to location? If you have a generic document, would you be willing to please send me a copy of it? Alternatively, if you have local procedures, would you please put me in touch with the relevant local contacts?
2. Do you conduct an interview with potential adopters or do they only complete a form that gathers their information? If you conduct an interview, what questions do you ask, and are they consistent from adoption to adoption?
3. How do you judge or score the responses given either via a questionnaire or interview? For example, are the responses to some questions given more

value than others, such as the amount of time that an adopter is away from home during the day, or if they live in an apartment versus a house with a garden? Please provide as much detail as you can.

4. Do you require that you meet all members of the adopter's family who will be living with the dog, or at least have some form of contact with them? If so, for what purpose?
5. Do you conduct a home visit prior to adoption? If so, are there specific criteria that must be met in order for an adoption to be approved? What are the details of this please?"

Organisations were additionally requested to provide supplementary material electronically or via post if possible (e.g. questionnaires, forms, etc.). Those who were posted the enquiry were provided with a postage paid return envelope. All organisations were also asked to provide a contact phone number if they preferred to discuss their responses by that means. Organisations were contacted between 30 August 2012 and 18 March 2013. (Henceforth organisations and their individual branches/centres will be referred to collectively as *organisations*.)

The data that was collected from the organisations (*data corpus)* (Braun & Clarke, 2006) was divided into three categories, collated on an Excel spreadsheet:

1. self-administered questionnaires (separate from home visit forms completed by staff/volunteers),
2. interviews (separate from interviews conducted at a home visit), and
3. pre-adoption home visits.

Pre-adoption home visits were separated from those conducted post-adoption. The latter were not evaluated further as this study was focused on what happens up to the point of adoption. Data was further divided within each of the three categories

listed above and recorded in the spreadsheet based on the questions included in the written enquiry. For each of the categories columns were created to note three additional criteria:

- whether each respondent employed the particular screening procedure,
- whether the procedure was standardised from case to case, and
- whether the items or topics addressed were known.

The interview and home visit categories contained additional columns to record who (e.g. staff or volunteer) was responsible for conducting the interview or home visit. Organisations were asked how responses from the screening procedures are scored or judged, so this information was recorded in a separate column. Of particular note was whether an organisation has specific, fixed criteria that must be met for an adopter to be deemed eligible to adopt any dog (*necessary criteria*) and whether any criteria or collection of criteria were adequate alone for acceptance (*sufficient criteria*). The former type of protocol was labelled *pass/fail scoring* on the spreadsheet. The specific, necessary criteria that each organisation uses for their pass/fail scoring was recorded in a column pertaining to how screening procedure responses are judged or scored. In this column, the necessary criteria (i.e. what is mandatory), was noted as such to differentiate it from the high value criteria (i.e. what is preferred, but not mandatory). Necessary criteria were identified either by organisations explicitly stating that it was required, or by the usage of the word *must* in their responses (e.g. must have a garden). This was recorded separately, as establishing this was necessary prior to proceeding with analysis for the current study. Once the entire data set was generated and organised in the spreadsheet in this manner, analysis began.

A thematic analysis was undertaken using the procedural framework outlined by Braun and Clarke (2006) to create the *data set,* this included only the information deemed relevant for analysis to achieve the current study's objective. As defined by Braun and Clarke (2006), "*A theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set.*"

The aim of the study was to conduct a qualitative analysis of rehoming organisations' adopter screening policies and procedures. Qualitative methods were used as they are better able than quantitative methods to navigate the breadth of such data at a more in-depth level. This analysis was conducted in relation to addressing four key questions, which might give insight into the culture underpinning assessment policy:

1. What information or characteristics about an adopter are reported as "most important"?
2. What information or characteristics about an adopter would lead them to be deemed unable to adopt a dog?
3. What evidence is in the scientific literature to support the inclusion of the "most important" characteristics as part of adopter screening assessments?
4. How are adopter screening assessments implemented at a practical level?

In order to address the first two questions, a "bottom up" or inductive approach was applied to the analysis of responses. The first question was addressed simply through the collation of data as described below and the second through the focused identification of organisations' implementation of a pass/fail scoring system, and the necessary criteria for an adopter to be deemed eligible to adopt a dog. The "bottom up" approach used consisted of identifying items and topics pertaining to similar

attributes or factors. These were then grouped to form a theme. Each theme was then given a simple name and definition based on the attributes or factors that it encompassed, since it was not necessarily obvious how one theme varied from another based solely on their names. Once themes were determined, sub-themes were generated from an assessment of what the organisations reported giving more weight to during assessments, i.e. the factors determined to be "most important". Using this portion of the data set, sub-themes were determined on the basis of two criteria:

1. the frequency of responses referring to a sub-theme (e.g. maximum amount of time that a dog is permitted to be left home alone during the day), or
2. a required factor that would determine whether or not the adopter is deemed eligible to adopt a dog (e.g. no laminate flooring in main living areas of residence). In this case, these factors may only have been stated by one organisation in the sample, but their necessity in the screening process warranted them becoming a sub-theme in their own right.

Creating sub-themes was a multi-stage process, which involved some redundancy in reading and re-reading this portion of the data set. This was done to identify the above criteria to establish tiers of sub-themes. Three tiers of sub-themes were established; the tiers progressed from broader concepts (e.g. a garden), to specific characteristics about that concept (e.g. a garden with a secure five-foot fence). Subsequent tiers were created based on the specificity of factors determined by the two criteria outlined above; a sub-theme based on either of these criteria could have resided in any of the tiers (e.g. a required factor to be eligible to adopt a dog may have been the first or the third tier). This process generated the data required to address the first two questions. However, not all themes contained sub-themes (e.g.

when there were no necessary criteria to adopt a dog as part of the theme). Similarly, those themes that did contain sub-themes did not all necessarily contain three tiers. The level of specificity was what separated the tiers.

In order address the third question, to determine if there is any scientific basis for the inclusion of the factors that are addressed or the types information sought during adopter screening assessments, the scientific literature was reviewed for three purposes:

1. to identify whether any statistically significant increased risks for relinquishment were associated with these factors were reported,
2. to identify whether any of these factors were statistically associated with a dog's quality of life or overall welfare, and
3. to identify whether any of these factors could be associated with an increased risk to human safety.

The scientific literature reviewed for the first purpose focused on characteristics of surrendering owners and their dogs, and reasons reported by owners for surrendering their dogs; any published studies with this focus were included, regardless of factors such as sample size and location of the study. Those that mentioned factors, such as in a solely descriptive manner, but did not report an increased risk for relinquishment associated with them, were noted but were not included as scientific evidence. Included within this body of literature are studies of rehoming success (i.e. dogs that have remained in a home) and dog relinquishment. It should be noted that samples from these two populations may yield similar risks or detect different risks, which may be due to potential biases within them (e.g. whether the study was conducted prospectively or retrospectively, which factors about participants and their dogs were statistically analysed to determine if they are

risk factors, whether studies' participants viewed their experiences positively or negatively) (see Table 2.1). The scientific literature reviewed for the second purpose investigated whether a series of owner and dog characteristics were associated with a good quality of life for a dog in a non-clinical population (e.g. dogs that were not ill); any published studies with this focus were included (see Table 2.1). For the third purpose, all factors included in assessments were reviewed to determine which factors may be included for the purpose of mitigating a risk to human safety. The scientific literature used for this purpose focused on reviewing incidence rates of humans who had suffered dog bites. Depending on the study, data was collected in various manners (e.g. reviewing hospital admission records, telephone interviews), and either included bites on any region of the body or on a specific area (e.g. the head). The studies reviewed for this purpose were primarily conducted in the US, as this happened to be where relevant studies were conducted. Similar to the literature reviewed for the first purpose, those studies that mentioned factors, such as in a solely descriptive manner, but did not report any statistical significance associated with them were noted but were not included as scientific evidence (see Table 2.1).

In order to address the fourth question, the responses pertaining to how adopter screening assessments are practically executed were evaluated. This includes how respondents score or judge potential adopters' responses, who is responsible for conducting home visits and interviews (for those respondents that use them), and the level of standardisation of screening methods.

Table 2.1

Scientific literature reviewed to identify whether factors included in adopter screening assessments are statistically associated with an increased risk for relinquishment, with a dog's quality of life, or a risk to human safety

Study	Sample size(s)	Location of study	Included for which purpose	Source(s) of data	Primary areas of focus of questions
Carter & Taylor, 2017	n=117[1]	Australia	Risk for relinquishment	• Retrospective analysis of shelter intake forms • Additional questionnaire administered (as part of the study) to surrendering owners at the point of relinquishment • Semi-structured interviews at the point of relinquishment	• Characteristics of relinquished dogs (e.g. neutered) • Reason(s) for relinquishment • Experiences of relinquishing owners (qualitative data from interviews)
Chen, Neumeier, Davies, & Durairaj, 2013	n=537	US	Risk to human safety	Review of paediatric patients' hospital medical records who had suffered a facial dog bite	• Characteristics of patients • Breed of dogs that inflicted the bites
Diesel et al., 2008	n=662	UK	Risk for relinquishment	• Veterinary records and behavioural assessments (from the rehoming organisation involved in the study) • Questionnaire completed by dog relinquishers via post 6-8 weeks post-relinquishment[2] • Telephone call six months post-adoption to ensure new owner still had the dog	• Characteristics of relinquished dogs (e.g. sex) • Information from previous owner about dog (e.g. how long dog was owned) • Care of dog by previous owner (e.g. where dog slept) • Behaviour of dog with previous owner • Reason(s) for relinquishment • Behavioural assessment in kennels at rehoming organisation • Information from new owner (e.g. owner expectations) • Care of dog by new owner • Behaviour of dog with new owner

Study	Sample size(s)	Location of study	Included for which purpose	Source(s) of data	Primary areas of focus of questions
Diesel et al., 2010	n=2,806	UK	Risk for relinquishment	Questionnaire completed (as part of the study) by relinquishing owners at the point of relinquishment	• Characteristics of relinquished dogs (e.g. sex) • Characteristics of and information from surrendering owners (e.g. how much time was dog left alone) • Behaviour of dog with previous owner • Reason(s) for relinquishment
Dolan, Scotto, Slater, & Weiss, 2015	n=166	US	Risk for relinquishment	Survey administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Reason(s) for relinquishment
Fuh, Tung, Tung, Chiang, & Fei, 2012	n=229	Taiwan	Risk for relinquishment	Telephone survey with surrendering owners post-relinquishment	• Characteristics of relinquished dogs (e.g. age) • Reason(s) for relinquishment
Gilchrist, Sacks, White, & Kresnow, 2008	n=5,638	US	Risk to human safety	Randomised telephone survey (government sponsored)	Incidence and characteristics of those who have sustained a dog bite
Horswell & Chahine, 2011	n=40	US	Risk to human safety	Review of paediatric patients' hospital medical records who had suffered a dog bite to the face, neck, or head	• Characteristics of patients • Descriptions of dog bites (e.g. anatomical area of injury) • Characteristics of dogs that inflicted the bites
Kwan & Bain, 2013	n=~80	US	Risk for relinquishment	Survey administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Dog training methods and tools used • Frequency of problematic behaviours displayed by dogs • Owner attachment to their dog • Reason(s) for relinquishment

Study	Sample size(s)	Location of study	Included for which purpose	Source(s) of data	Primary areas of focus of questions
Marinelli, Adamelli, Normando, & Bono, 2007	n=104	Italy	Quality of life	• Three questionnaires administered to dog owners • Physical examination of the dogs • Strange Situation Test • Lexington Attachment to Pets Scale	• Characteristics of dog owners (e.g. employment status) • Characteristics of owned dogs (e.g. age) • Dogs' attachment level to their owners • Owners' level of attachment to their dogs
Marston et al., 2004	n=3,123[3]	Australia	Risk for relinquishment	Shelter records for admitted dogs	• Characteristics of relinquished dogs (e.g. age) • Reason(s) for relinquishment
Mondelli et al., 2004	n=307	Italy	Risk for relinquishment	Survey administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners and home environment (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Care of dog by surrendering owner (e.g. training with dog) • Behaviour of dog in home (e.g. where did the dog sleep?) • Reason(s) for relinquishment
New et al., 2000	n=2,631	US	Risk for relinquishment	Structured interview with dog relinquishers post-relinquishment[2]	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Frequency of undesirable behaviours exhibited by dog prior to relinquishment (e.g. unwanted barking) • General animal and dog behaviour knowledge of dog relinquishers
Patronek et al., 1996	n=285	US	Risk for relinquishment	Structured telephone interview with dog relinquishers post-relinquishment[4]	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Frequency of undesirable behaviours exhibited by dog prior to relinquishment (e.g. unwanted barking)

Study	Sample size(s)	Location of study	Included for which purpose	Source(s) of data	Primary areas of focus of questions
Patronek, Sacks, Delise, Cleary, & Marder, 2013	n=256	US	Risk to human safety	Interviews with employees of law enforcement agencies	• Victim-related factors in dog bite-related fatalities (e.g. age of person) • Dog-related factors in those fatalities (e.g. location in which dog was kept)
Salman et al., 1998	n=3,676	US	Risk for relinquishment	Questionnaire administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners (e.g. education level) • Characteristics of relinquished dogs (e.g. age) • Frequency of undesirable behaviours exhibited by dog prior to relinquishment (e.g. unwanted barking) • Reason(s) for relinquishment • Care of dog by surrendering owners • General animal and dog behaviour knowledge of dog relinquishers
Scarlett et al., 1999	n=2,045	US	Risk for relinquishment	Questionnaire administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners (e.g. education level) • Characteristics of relinquished dogs (e.g. age) • Frequency of undesirable behaviours exhibited by dog prior to relinquishment (e.g. unwanted barking) • Reason(s) for relinquishment • Care of dog by surrendering owners • General animal and dog behaviour knowledge of dog relinquishers
Schalamon et al., 2006	n=341	Austria	Risk to human safety	Review of paediatric patients' hospital medical records	• Characteristics of patients • Descriptions of dog bites (e.g. anatomical area of injury) • Characteristics of dogs that inflicted the bites

Study	Sample size(s)	Location of study	Included for which purpose	Source(s) of data	Primary areas of focus of questions
Shore, 2005	n=~100	US	Risk for relinquishment	• Form completed by surrendering owners (routine form used by shelter) • Adoption records from shelter • Telephone interview with dog relinquishers post-relinquishment[4]	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs • Information about the dog's stay in the home • Reason(s) for relinquishment
Shuler, DeBess, Lapidus, & Hedberg, 2008	n=636	US	Risk to human safety	Review of dog bite injury records from municipal animal control office	• Characteristics of people who suffered dog bites • Characteristics of dogs that inflicted the bites
Vućinić et al., 2009	n=156[5] n=1,005[6]	Serbia	Risk for relinquishment	Questionnaire administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Reason(s) for relinquishment
Weiss, Friedman, & Coben, 1998	n=333,687	US	Risk to human safety	Government survey of hospital emergency department patient cases	Incidence and characteristics of dog bite injuries treated in hospital emergency departments
Weiss et al., 2014b	n=~150	US	Risk for relinquishment	Survey administered (as part of the study) to surrendering owners at the point of relinquishment	• Characteristics of surrendering owners (e.g. employment status) • Characteristics of relinquished dogs (e.g. age) • Reason(s) for relinquishment • Actions taken to keep dog and assistance that might have prevented relinquishment

[1] The study reported the total sample size for owners relinquishing companion animals (dogs and cats), but it did not report the sample size for just those relinquishing dogs.
[2] The study was completed prospectively; the sample was comprised of dogs relinquished to the rehoming centre who were then rehomed.
[3] The study included all dogs admitted to the shelter; this sample size is just for owner relinquished dogs.
[4] The amount of time that lapsed between the point of the relinquishment and the interview was not reported.
[5] Dogs relinquished for adoption/rehoming
[6] Dogs relinquished for euthanasia

2.3. Results

Responses that included information about adopter screening policies and procedures were received from 82/269 respondents, which was 30.5% of the sample of organisations to which the written enquiry was sent. Of the 82 respondents, 45 (54.9%) were part of multi-branch organisations, and 37 (45.1%) were single-site organisations. Twenty-six of the 82 respondents (31.7%) were breed-focused (e.g. greyhounds), and one (1.2%) only dealt with senior dogs.

Pre-adoption home visits were the most commonly used adopter screening method and were used by 81/82 respondents (98.8%) at least some of the time. This was followed by interviews, which were used, at least sometimes, by 69/82 respondents (84.1%), and self-administered questionnaires, which were the least frequently used method. They were used by 67/82 respondents (81.7%) (see Table 2.2).

Table 2.2

Frequency of adopter screening methods used by respondents (n=82)

	Always used	Sometimes used	Never used	(No info)
Pre-adoption home visits	73/82 (89.0%)	8/82 (9.8%)	1/82 (1.2%)	0
Interviews	68/82 (82.9%)	1/82 (1.2%)	3/82 (3.6%)	10/82 (12.2%)
Self-administered questionnaires	67/82 (81.7%)	0	11/82 (13.4%)	4/82 (4.8%)

Not all respondents provided information about what adopter factors or characteristics are addressed in each screening method. 54/81 respondents (66.7%) provided information about what factors are addressed in pre-adoption home visits. 53/67 respondents (79.1%) provided information about factors addressed in self-administered questionnaires. 30/69 respondents (43.5%) provided information about factors addressed in interviews.

2.3.1. What information or characteristics about an adopter are reported as "most important"?

The thematic analysis of factors addressed in all three of the adopter screening methods resulted in ten themes emerging: *accommodation*, *awareness of needs*, *demographics*, *dog information*, *dog reaction*, *education*, *expectations*, *experience*, *family*, and *work/lifestyle*. A definition was created for each theme to give clear boundaries to each one (see Table 2.3).

Table 2.3

Themes present, their definition, and prevalence in self-administered questionnaires, interviews, and pre-adoption home visits

Theme	Definition	Themes present in each screening method		
		Questionnaires	Interviews	Pre-adoption home visits
Accommodation	• The type of accommodation in which the adopter lives (e.g. house, flat), and the nature of the housing (e.g. council, HM Forces), and if there is garden access, and if so is it enclosed? • If the accommodation is rented, the organisation may require written approval from the landlord that a dog is permitted (e.g. tenancy agreement or letter)	√	√	√
Awareness of needs	The adopter's awareness of dogs' needs, and their preparedness to meet such needs, often specifically focusing on the needs of the particular dog (e.g. the cost of veterinary care for the dog's chronic health condition)			√
Demographics	The adopter's name, address, contact info, and age	√	√	
Dog information	• What sort of dog the adopter is seeking (e.g. sex, breed, size, age) • Specific desired characteristics of a dog (e.g. friendly with other dogs, good when left alone) • The identifying information of a particular dog the adopter has in mind that is part of the organisation (e.g. a dog they have seen on the organisation's website)	√	√	√
Dog reaction	Gauging the potential adoptee dog's reaction to family members, their accommodation, and overall new environment by bringing the dog along on a home visit			√
Education	Educating the adopter and other members of the household about responsible dog ownership (e.g. proper handling, training, and general care of a dog)			√
Expectations	The adopter's expectations of having a dog in general, including vet and other related costs, responsibilities of having a dog (e.g. amount of daily exercise to be provided)	√	√	

Theme	Definition	Themes present in each screening method		
		Questionnaires	Interviews	Pre-adoption home visits
Experience	The adopter's current and past experience with dogs (e.g. do they currently have a dog, and if so is the dog neutered and vaccinated, vet reference)	√	√	√
Family	• The adopter's family structure (e.g. children in the household, other animals in the household besides dogs), and history of family members' medical issues associated with dogs (e.g. allergies) • In the case of home visits, some organisations may require all family members living in the household to be present	√	√	√
Work/lifestyle	The nature of the adopter's job (e.g. full time, hours worked per day, time dog would be left alone daily, etc.), and other upcoming events (e.g. planned holiday, expecting a baby, moving house)	√	√	√

Seven of the ten themes contain a series of sub-themes (see Figure 2.1). Each sub-theme presented at least one "most important" characteristic of a potential adopter as defined in this study (see section 2.2). One theme, *awareness of needs*, was, in itself, a "most important" characteristic itself. Sub-themes were comprised of both objective, measurable factors (e.g. garden fence height), and subjective factors (e.g. adopter must have a genuine desire to provide a long-term home for a dog). A total of 36 sub-themes were created spanning three tiers, though not all themes contained that many tiers. *Accommodation* had both the greatest number of sub-themes and the most tiers, followed by *family*. *Awareness of needs*, *dog information*, and *dog reaction* did not have any sub-themes (see Table 2.4). Aspects of the latter two sub-themes were included in the adopter screening process, which is why the themes exist, but characteristics pertaining to them were not reported by organisations as

either “most important” or something that would lead an adopter being deemed unable to adopt a dog.

Figure 2.1

Adopter screening item themes and sub-themes

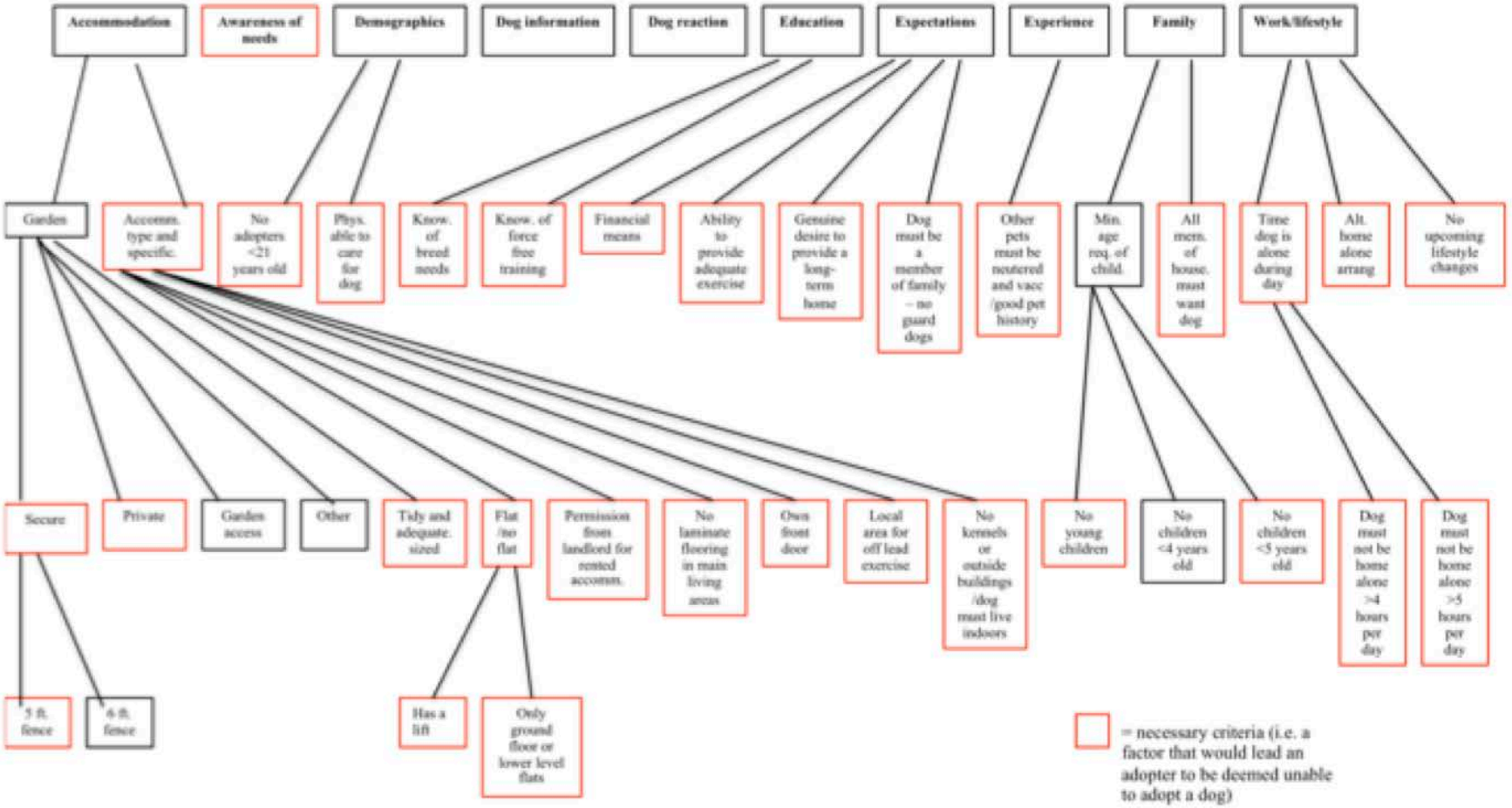


Table 2.4

Number of "most important" characteristics of a potential adopter by theme

Theme	Number of characteristics (sub-themes)	Number of tiers
Accommodation	17	3
Family	5	2
Work/lifestyle	5	2
Expectations	4	1
Demographics	2	1
Education	2	1
Experience	1	1
Awareness of needs[1]	0	
Dog information	0	
Dog reaction	0	

[1] Awareness of needs as a theme was a "most important" characteristic itself.

2.3.2. What information or characteristics about an adopter would lead them to be deemed unable to adopt a dog?

Within the themes are sub-themes that represent characteristics of a potential adopter that would lead them to be deemed unable to adopt a dog by some organisations. Not all organisations screen potential adopters in this manner and have such criteria. 40/82 respondents (48.8%) were identified as having this scoring system; 35/82 respondents (42.7%) do not have it. 7/82 respondents (8.5%) did not provide any information about how they judge or score adopters' responses during the screening process.

Thirty-one characteristics about an adopter were identified by at least one respondent as preventing adoption of a dog (see Figure 2.1). Thirty of them were sub-themes and one, *awareness of needs*, was a theme. The only themes that contained characteristics that were highly valued but not required were *accommodation* and *family*. The majority of the "most important" characteristics were also deemed to be features that could prevent adoption of a dog, but possibly only by one organisation (e.g. "knowledge of breed needs"). Additionally, some characteristics are preferable but not required for other respondents (e.g. "no young

children"), but because they were reported as a requirement by at least one respondent they were included in this subset. The characteristic that was most frequently reported by respondents as required was "garden", followed by "amount of time dog is alone during day", "secure garden", and "no kennels or outside buildings/dog must live indoors". "Amount of time dog is alone during day" and "garden" were also most frequently reported as preferred characteristics. Nine characteristics were reported as required by only one respondent and were not preferred by any respondents; these characteristics included "all members of household must want dog", "knowledge of force free training, and "no adopters <21 years old" (see Table 2.5).

Table 2.5

Respondent frequency of "preferred" versus "required" "most important" characteristics

Characteristic	Number of respondents as preferred characteristic	Number of respondents as required characteristic
Ability to provide adequate exercise	1	1[1]
Accommodation type and specification	1	1
Flat/no flat	4	2
Has a lift	0	2
Only ground floor or lower level flats	0	5[2]
Local area for off-lead exercise	0	1
No laminate flooring in main living areas of house	0	1
No kennels or outside buildings/dog must live indoors	1	8
Own front door	0	1
Permission from landlord for rented accommodation	0	4
All members of household must want dog	0	1
Alternate home alone arrangements for dog	3	7[1]
Amount of time dog is alone during day	13	16
Dog must not be home alone for >4 hours per day	1	6
Dog must not be home alone for >5 hours per day	1	4
Awareness of needs	0	1
Dog must be member of family – no guard dogs	0	4
Financial means to care for dog	0	2
Garden	12	17
Garden access	5	0
Other (features of garden)	2	0
Private garden	0	4
Secure garden	4	13
5 foot fence	0	2
6 foot fence	2	0
Tidy and adequately sized	0	1
Genuine desire to provide a long-term home for a dog	0	1
Knowledge of breed needs	3	1
Knowledge of force free training	0	1
Minimum age requirement of children in household	2	0
No children <4 years old	1	0
No children <5 years old	2[3]	4[3]
No young children	7	3[4,5]
No adopters <21 years old	0	1
No upcoming lifestyle changes	0	1
Other pets must be neutered and vaccinated / good pet history	3	4

Characteristic	Number of respondents as preferred characteristic	Number of respondents as required characteristic
Physically able to care for dog	0	1

[1] For one respondent only if the adopter lives in a flat
[2] One respondent will only rehome small dogs to adopters living in flats
[3] For one respondent only applies to puppies being rehomed
[4] For one respondent only applies if young children will be left alone with dog for long periods of time
[5] For one respondent only applies if a dog's history is unknown

2.3.3. What evidence is in the scientific literature to support the inclusion of the "most important" characteristics as part of adopter screening assessments?

Evidence in the scientific literature to support inclusion of the 36 sub-themes and one theme (*awareness of needs*) as part of their adopter screening assessments was found in studies that examined risk factors for relinquishment. Such studies were often conducted retrospectively. Findings of these studies can be divided into two categories: reasons for relinquishment provided by surrendering owners, and descriptive characteristics of the surrendering owners. Depending on the policies of the organisations that participated in such studies or on the design of the study, it is possible that surrendering owners could have provided multiple reasons for relinquishment. Evidence in the scientific literature to support the inclusion of "most important" characteristics on the basis of ensuring good welfare and quality of life for a dog was found in a study that investigated the influence of owner and dog characteristics on pet dogs' quality of life. Scientific research to support the sub-themes has been organised by theme. The only theme for which there was any evidence to support the inclusion of any of its sub-themes on the basis of dog welfare was *experience*; the evidence for other sub-themes pertains to risk factors for relinquishment. Dog *information* and *dog reaction* were excluded from this part of the analysis as they did not contain any of the "most important" characteristics about an adopter.

2.3.3.1. Accommodation

There is mention in the academic literature of six of the "most important" characteristics in this theme: "living in a flat or apartment", "landlord issues", "the presence of a garden", having a "secure garden", and "no kennels or outside buildings/dog must live indoors" (Carter & Taylor, 2017; Diesel et al., 2010; Kwan & Bain, 2013; Mondelli et al., 2004; Patronek et al., 1996; Salman et al., 1998; Shore, 2005; Weiss et al., 2014b). Two characteristics, "living in a flat or apartment" and "no kennels or outside buildings/dog must live indoors", are reported to be statistically associated with an increased risk for relinquishment (Kwan & Bain, 2013; Mondelli et al., 2004; Patronek et al., 1996).

Living in a flat or apartment: "Living in a flat or apartment" is mentioned in four studies (Diesel et al., 2010; Mondelli et al., 2004; Patronek et al., 1996; Shore, 2005). Two of those studies (Mondelli et al., 2004; Patronek et al., 1996) indicated that "living in a flat or apartment" is a risk factor for relinquishment. Patronek et al. (1996) reported that 5.6% (16/285) of surrendering owners lived in an apartment and the study concluded that living in an apartment is associated with an increased risk for relinquishment (OR, 2.78; 95% CI: 1.36-5.63). Mondelli et al. (2004) noted a relationship between accommodation type and adoption length; adopters living in apartments kept their dog for a statistically significantly shorter period of time than those living in a house. As a descriptive characteristic of surrendering owners, Weiss et al., (2014b)[3] reported that 64.7% (97/150) of them lived in an apartment or condo, Shore (2005) reported that 10.3% (8/78) of them lived in an apartment, and Diesel et al. (2010) reported that 6.6% (185/2,806) of owners relinquishing a dog lived in a flat.

[3] All dogs included in this study were large dogs (≥ 40 lbs.).

Landlord issues: "Landlord issues", or reference to them, are mentioned in five studies (Carter & Taylor, 2017; Diesel et al., 2008; Diesel et al., 2010; Mondelli et al., 2010; Salman et al., 1998), but none of the studies provide specific statistical evidence that landlord issues were associated with an increased risk for relinquishment. Diesel et al. (2008) reported that "landlord issues" was a reason given for return of 9.5% (63/662) of dogs. Salman et al. (1998) reported that issues pertaining to the owners' landlord was reason for relinquishment for 6% (278/3,676)[4] of dogs, which was one of the top 10 reasons provided for relinquishment. Diesel et al. (2010) reported that 12.0% (338/2,806), but the study did not clarify what proportion were relinquished specifically due landlord issues. Mondelli et al. (2010) reported that "apartment block regulations", which suggests "landlord issues", was a reason for relinquishment for 4.5% (14/307) of dogs. Carter and Taylor (2017) report that 12%[5] of dogs were relinquished due to "not being allowed", which also suggests "landlord issues".

The presence of a garden: The "presence of a garden/outside space" is mentioned in two studies (Diesel et al., 2010; Mondelli et al., 2004). Mondelli et al. (2004) concluded that having a house with outdoor space positively influenced the length of adoption. The other study did not statistically assess whether having or not having a garden was associated with an increased risk for relinquishment, but the authors did highlight the notable difference in percentages. Diesel et al. (2010) noted that the majority of dogs being surrendered had a garden or yard (91.2% [2,560/2,806]), and only 5.9% (166/2,806) did not have one.

[4] Although they are not equal, the percentage and proportion are as reported in the study.
[5] The study reported the total sample size for owners relinquishing companion animals (dogs and cats: n=117), but it did not report the sample size for those relinquishing dogs.

Secure garden: Any reference to a "secure garden" is only mentioned in one study (Salman et al., 1998), but it did not statistically assess whether or not having a "secure garden" was associated with increased risk for relinquishment. They noted that inadequate fencing was a reason provided for 1% (37/3,676) of dogs relinquished.

No kennels or outside buildings/dog must live indoors: Kwan and Bain (2013) reported that relinquishing owners were statistically more likely to keep their dogs outside 100% of the time compared with continuing owners (i.e. a control sample of owners who are not relinquishing their dog) ($p = .03$).

2.3.3.2. Family

There is mention of, or reference to, all five of the "most important" characteristics that comprise this theme in the literature (Chen et al., 2013; Diesel et al., 2008; Diesel et al., 2010; Gilchrist et al., 2008; Horswell & Chahine, 2011; Marston et al., 2004; Mondelli et al., 2004; Salman et al., 1998; Schalamon et al., 2006; Shuler et al., 2008; Weiss et al., 1998). None of the studies pertaining to relinquishment have assessed statistically whether any of the factors were associated with an increased risk for relinquishment. The factors are either descriptive characteristics of the surrendering owner and their household (e.g. ages of children), or the frequency with which it was given as a reason for relinquishment (e.g. "all members of the household not wanting dog"). The factors pertaining to ages of children in the household may also be included in assessments for the purpose of minimizing a potential human safety risk. Four studies reported a statistically increased risk of human injury associated with ages of children (Chen et al., 2013; Schalamon et al., 2006; Shuler et al., 2008; Weiss et al., 1998). (The four factors

concerning ages of children are grouped together below as there is overlap within the factors (e.g. “no young children” could also refer to “no children <4 years old”).

Minimum age requirements of children in the household, no children <4 years old, no children <5 years old, and no young children: In the studies pertaining to dog relinquishment, there is mention of ages of children in the household in two studies (Diesel et al., 2008; Diesel et al., 2010), but in one of the studies (Diesel et al., 2010) it is only mentioned as a descriptive characteristic of surrendering owners. Diesel et al. (2008) concluded that dogs rehomed to families with children <13 years old were statistically more likely to be adopted unsuccessfully (i.e. they were more likely to be relinquished) (OR, 1.8; 95% CI: 1.3-2.5). Diesel et al. (2010) reported that a greater percentage of dogs being relinquished had children in the home that were 1-5 years old (10.9% [305/2,806]) than those that had children in the home that were <1 year old (3.4% [96/2,806]). In the studies pertaining to human injury risk, Schalamon et al. (2006) reported that the highest incidence of dog bites was in 1-year old children, with the incidence decreasing thereafter with age; 73% of children (248/341) bitten were younger than 10 years old. The study reported that children who sustained dog bites to their head and neck were significantly younger compared with the total study population (i.e. 0-16 years) with a mean age of 4.1 years old ($p < .01$). The study also reported that children who were younger than 5 years old sustained significantly more dog bite attacks by small dogs compared with older children ($p = .04$). Similarly, Shuler et al. (2008) reported that the rate of dog bites sustained by boys aged 5-9 years old was significantly higher than the rate of other male age categories ($p = .01$), and had the highest incidence rate of any other sex/age category (178 per 100,000 children). In an analysis of people seeking treatment for dog bites in hospital emergency departments, Weiss et al. (1998)

reported that the incidence rate of dog bites sustained by children 0-9 years old was significantly higher than for any other age group of children or adults in the study, and especially boys aged 5-9 years old had the highest rate, 60.7 emergency department visits per 10,000 people (95% CI: 34.8-86.6). In an analysis of children and adults who suffered a dog bite-related fatality, Patronek et al. (2013) reported that nearly half were children <5 years old (45.3% [116/256]). Gilchrist et al. (2008) reported that incidence rate of dog bites among children was highest for 5-9 year olds (18.7 per 1,000 children). Horswell and Chahine (2011) noted in children that had incurred a dog bite to the face, head, or neck, most children were 0-4 years old (45%, 18/40), followed by 5-9 year old children (38% [15/40]). In an analysis of children who sought medical attention for a facial dog bite, Chen et al. (2013) reported that the majority occurred in children 0-5 years old (68% [365/537]), and the highest incidence occurred in 3-year old children (15.8% [85/537]). The authors noted that the incidence rate decreased with increasing age. The study also reported that children 0-5 years old and 6-12 years old were significantly more likely to have known the dog that bit them ($p < 0.0001$; $p = 0.0018$, respectively).

All members of household must want the dog: Reasons for relinquishment related to "all members of the household not wanting the dog" are mentioned in three studies (Marston et al., 2004; Mondelli et al., 2004; Salman et al., 1998), although none of them statistically assessed if reasons related to members of the household not wanting the dog were associated with an increased risk for relinquishment. Marston et al. (2004) noted that 0.90% (9/997) of dogs were relinquished because the surrendering owner's partner did not want the dog. This reason is part of the "owner related" category of reasons, but it was the third least common reason within that category. Salman et al. (1998) reported that "parent

won't allow" was a reason given for the relinquishment of 1% (42/3,676) of dogs, while Mondelli et al. (2004) reported that of the 34.0% (105/307) of dogs relinquished for the class of reasons called "management problems", 3.5% (11/307) were supposedly relinquished due to "family members-pet conflict".

2.3.3.3. Work/lifestyle

Four of the "most important" characteristics ("amount of time dog is alone during day", "must not be alone for >4 hours", "must not be alone for >5 hours", and "lifestyle changes") are mentioned in the scientific literature (Carter & Taylor, 2017; Diesel et al., 2008; Diesel et al., 2010; Fuh et al., 2012; Marston et al., 2004; Salman et al., 1998; Scarlett et al., 1999; Vučinić et al., 2009). However, none of these studies calculated any of the characteristics as being associated with an increased risk for relinquishment.

Amount of time dog is alone during day: The "amount of time a dog is left home alone during the day" is only mentioned in one study (Diesel et al., 2010). However, the study collected the data only descriptively as characteristics of surrendering owners and their home environments; none of the range of time categories were statistically assessed to find out if they were associated with increased risk for relinquishment. Diesel et al. (2010) reported that 22.2% (622/2,806) of dogs relinquished were left alone for 4-6 consecutive hours, and 18.8% (526/2,806) were left alone for >6 hours. Salman et al. (1998) did not look at specific amounts of time a dog was left alone, but did conclude that dogs were at increased risk for surrender if they spend most of the day in a yard or crate.

Lifestyle changes: "Lifestyle changes" as a category or reasons for relinquishment that would qualify as "lifestyle changes" (e.g. owner pregnancy) are mentioned in nine studies (Carter & Taylor, 2017; Diesel et al., 2008; Diesel et al., 2010; Fuh et

al., 2012; Marston et al., 2004; Salman et al., 1998; Scarlett et al., 1999; Shore, 2005; Vučinić et al., 2009). However, none of the studies report any of these factors as being statistically associated with an increased risk for relinquishment. Vučinić et al. (2009) reported that owner "lifestyle changes" accounted for 11.54% (18/156) of dogs being relinquished, which was the third most common reason for relinquishment. Scarlett et al. (1999) noted three reasons that could be classified as "lifestyle changes" as reasons for relinquishment. A new baby accounted for 2.3% (47/2,045) of dogs relinquished; divorce accounted for 1.3% (27/2,045) of dogs, and owner pregnancy for 0.5% (10/2,045) of dogs. Salman et al. (1998) reported that moving was a reason for relinquishment for 7% (341/3,676)[6] of dogs, a new baby and divorce were each given as reasons for 1% (48/3,676 and 27/3,676, respectively) of dogs, and owner pregnant was a reason for <1% (11/3,676) of dogs. This study does not claim that any of these factors were a cause of an increased risk for relinquishment. Diesel et al. (2008) reported that a relationship break-up was the reason for 2.3% (15/662) of dogs returned. Diesel et al. (2010) reported four reasons that could be classified as lifestyle changes. Moving/landlord was a reason for relinquishment for 12.0% (338/2,806) of dogs, although the study did not specify what proportion was due to moving. A relationship break-up was a reason for relinquishment for 4.7% (133/2,806) of dogs; owner having a baby was a reason for relinquishment for 0.5% (12/2,806); and change of personal circumstances was a reason for 0.3% (7/2,806) of dogs. Marston et al. (2004) reported that of the 31.92% (997/3,123) of dogs relinquished related for owner related reasons (the most common category of reasons for relinquishment), 40.42% (403/997) were relinquished due to accommodation and moving. Carter and Taylor (2017) reported

[6] Although they are not equal, the percentage and proportion are as reported in the study.

that 12%[7] of dogs were relinquished due to moving. Fuh et al., (2012) reported that 4.4% (10/229) of dogs were relinquished due to owner relocation. Shore (2005) reported that 3.85% (3/78) of dogs were relinquished due to moving.

2.3.3.4. Expectations

Of all the characteristics identified here, only "financial means" is referenced in the literature; it is mentioned descriptively in four studies (Diesel et al., 2010; Marston et al., 2004; Salman et al., 1998; Vučinić et al., 2009). However, two additional studies (Dolan et al., 2015; Patronek et al., 1996) statistically assessed the risk factor for relinquishment associated with owners' financial situations and specific annual household income ranges. Vučinić et al. (2009) reported that the most common reason for relinquishment of dogs for rehoming was owner financial problems; it was the reason provided for 26.92% (42/156) of dogs relinquished for this purpose. The study also reported that 4.68% (47/1005) of dogs relinquished for euthanasia had a curable illness or trauma that the owner did not have enough money to pay for. Salman et al. (1998) reported that issues related to cost was a reason given for the relinquishment of 5% (224/3,676)[8] of dogs. Marston et al. (2004) reported that 4.71% (47/997) of dogs were relinquished for financial reasons. Diesel et al. (2010) noted that cost was a reason for relinquishment for 0.6% (16/2,806) of dogs. Salman et al. (1998), Marston et al. (2004), or Diesel et al. (2010) did not try to conclude that financial reasons were associated with an increased for relinquishment. Patronek et al. (1996) reported that compared with households that had an annual income of >75,000 USD, dogs in those with annual incomes of <40,000 USD were associated with a significantly increased risk for relinquishment, and households with incomes of <20,000 USD were associated with

[7] The study reported the total sample size for all companion animals relinquished (dogs and cats: n=192), and it did not report the sample size for just dogs relinquished.
[8] Although they are not equal, the percentage and proportion are as reported in the study.

the greatest risk of relinquishing a dog (OR, 4.43; 95% CI: 2.23-8.81). It should be noted when considering the annual income amounts that Patronek et al. (1996) was published over twenty years ago, so the figures may not be representative of today. Dolan et al. (2015) reported that dog owners who were on public assistance were statistically more likely to relinquish a dog (OR, 2.3; CI: 1.1-4.9). The study also reported that 71% (115/162) of surrendering owners stated that cost (i.e. inability to pay for some dog care) was either a primary or secondary factor in their decision to relinquish their dog.

2.3.3.5. Demographics

Only the characteristic "no adopters <21 years old" within this category, is mentioned in relation to relinquishment, but only one study (Salman et al., 1998) mentions the specific age range. Salman et al. (1998) reported that 4.3% (172/3,676)[9] of surrendering owners were <21 years old, but did not report that adopter age put dogs at an increased risk for relinquishment. However, Diesel et al. (2008) did report that dogs adopted by people <25 years old were statistically more likely to be rehomed unsuccessfully (OR, 2.9; 95% CI: 1.7-5.0) compared to those adopted by people >50 years old. New et al. (2000) noted that surrendering owners were significantly more likely to be <50 years old, and they were most likely to be 20-24 years old (OR, 10.3; 95% CI: 6.9-15.8), followed by <20 years old (OR, 7.7; 95% CI: 4.6-13.0). Shore (2005) mentioned a similar age range, but only descriptively; the study reported that 2.6% (2/78) of dogs were relinquished by owners <20 years old. Kwan and Bain (2013) reported that 8% (6/76) of surrendering dog owners were 19-24 years old, but owners in this age range were not statistically more likely to relinquish a dog compared with continuing owners.

[9] Although they are not equal, the percentage and proportion are as reported in the study.

2.3.3.6. Education

Neither of the two "most important" characteristics that comprise this theme, "knowledge of breed needs" and "knowledge of force free training", appear to be mentioned in the scientific literature.

2.3.3.7. Experience

The one "most important" characteristic in this theme, "other pets must be neutered and vaccinated/good pet history", was not found to be mentioned in the scientific literature pertaining to risk factors for relinquishment. However, there was a reference to it in the literature pertaining to a dog's welfare. Marinelli et al. (2007) reported that the level of attachment, which the study used as an indicator of a dog's quality of life, was statistically stronger between dog and owner if the owner had previous experience with pets ($p = 0.03$). The study did not specify the quality of care or experience that the owners had in their sample, so it is not known whether such owners had what would be qualified as having "good pet history", and thus this cannot necessarily be considered as evidence for the inclusion of this characteristic.

2.3.3.8. Awareness of needs

This theme is a "most important" characteristic in itself, and as such it is a broad category. The respondent that reported it as a factor that could lead to an adopter being deemed unable to adopt a dog did not elaborate further. One possible component of this could be an awareness of the amount of time required for the dog's care, which is mentioned in six studies (Diesel et al., 2008; Diesel et al., 2010; Mondelli et al., 2010; Salman et al., 1998; Scarlett et al., 1999; Vučinić et al., 2009). However, none of the studies statistically evaluated the significance of this factor to determine if it was associated with an increased risk for relinquishment. Diesel et al. (2010) reported that "needs more attention than can be given", which implies a lack of time, was a reason for relinquishment for 28.2% (794/2,806) of dogs.

Vučinić et al. (2009) reported that "lack of time for dog" accounted for 20.51% (32/156) of dogs relinquished, which was the second most common reason for relinquishment. Diesel et al. (2008) reported that "needs more attention", which again implies a lack of time, was a reason for relinquishment for 15.5% (103/662) of dogs. Scarlett et al. (1999) reported that "no time for the dog" was the most common reason for relinquishment and was given for 9.4% (193/2,045) of dogs surrendered. Of that group, nearly 70% of surrendering owners had their dog for less than one year. Mondelli et al. (2010) noted that 8.8% (27/307) of dogs were relinquished due to lack of time. Salman et al. (1998) also noted that 4% (212/3,676)[10] of dogs were relinquished due to lack of time.

2.3.4. How are adopter screening assessments implemented at a practical level?

Information on how responses gathered from the adopter screening process are scored was provided by 75/82 respondents (91.5%). As previously discussed, 40/82 respondents (48.8%) use a pass/fail scoring system. Including these respondents, a total of 49/75 (65.3%) appear to have specific criteria that they either require or highly value. The way in which the remaining respondents score or judge adopters' responses can be divided into two categories: those who use the information to match the adopter to a specific dog, and those who equally value or collectively assess all of the information they gather from an adopter to gain an overall picture. 15/75 respondents (20.0%) score responses in the former manner; they are focused on a specific dog's needs and if the potential adopter is able to meet those needs based on the information they have gathered during the screening process. Depending on a given dog's needs, they may more highly value some adopter criteria over others. 11/75 respondents (14.7%) claim to equally value or

[10] Although they are not equal, the percentage and proportion are as reported in the study.

collectively assess all of the information they gather to gain an overall picture. They may also be using this information to help them match a dog to the adopter.

Of the respondents that always or sometimes use home visits as an adopter screening method, 25/81 (30.9%) provided information on who conducts their home visits. 10/25 respondents (40%) reported that their home visits are conducted only by volunteers, and 7/25 respondents (28%) reported that they are conducted only by trained home checkers. The respondents who reported that they use home checkers did not clarify whether such individuals are staff members or volunteers. One respondent who uses volunteers specified that they are trained volunteers, and another respondent specified that they are experienced volunteers. The responses for the remaining 8/25 respondents (32%) were grouped into an *other* category, as they could not be definitively included in the other two categories. The *other* category included, though was not limited to, a representative from the respondent or another ADCH member, a member of management, and a trustee.

Of the respondents that always or sometimes use interviews, 20/69 (29%) provided information on who conducts their interviews. Of those, 13/20 respondents (65%) reported that only staff conduct their interviews, 5/20 respondents (25%) reported that only volunteers conduct them, and 2/20 (10%) reported that they are conducted either by staff or volunteers.

The greatest level of standardisation in the three adopter screening methods was in self-administered questionnaires; they were completely standardised for 64/67 respondents (95.5%). The least level of standardisation was in interviews; they were completely standardised for only 13/69 respondents (18.8%), but were partially standardised (29/69 respondents, 42.0%) (see Table 2.6). For the respondents that conduct completely standardised home visits, 15/32 (46.9%)

require the individual who is conducting the home visit to make subjective judgements about the suitability of the adopter and their environment (e.g. a home visit form that includes the item, “Your assessment of their suitability to adopt [this breed].”).

Table 2.6

Standardisation of self-administered questionnaires, pre-adoption home visits, and interviews

	Standardised	Somewhat standardised	Unstandardised	No information
Self-administered questionnaires	64/67 (95.5%)	0	3/67 (4.5%)	0
Pre-adoption home visits	32/81 (39.5%)	17/81 (21.0%)	8/81 (9.9%)	24/81 (29.6%)
Interviews	13/69 (18.8%)	29/69 (42.0%)[1]	15/69 (21.7%)	12/69 (17.4%)

[1] For organisations that use a form as part of the interview, this refers to any alterations of any magnitude to it.

2.4. Discussion

Rehoming organisations may include the "most important" characteristics in adopter screening assessments for three primary reasons: to reduce the risk of relinquishment of the dog, to ensure a good quality of life for the dog, and to reduce the risk to human safety. The majority of the evidence that could be found in the literature justified the inclusion of the characteristics for the first reason, though there was some evidence to justify their inclusion for the third reason, specifically those characteristics pertaining to the age of children in the home.

Nearly half of the "most important" characteristics (17/35, 46.0%) were found to be around the *accommodation* theme, which indicates considerable attention to a potential adopter's physical environment, especially a garden and the type of building and its features. Considering how highly they value such factors and how many of them would lead an adopter to be deemed unable to adopt a dog, it might seem reasonable to suppose that the literature should support this, i.e. these are established risk factors for relinquishment. However, this is not the case. Several of the factors referred to are quite specific, (e.g. "no laminate flooring in main living areas of house"), and do not appear to have been considered in previous studies, highlighting the importance of understanding what organisations are asking

about using methods such as those used in this study. The scientific evidence to support the importance of a garden is also questionable, even if up to 10% of dogs being relinquished came from homes without a garden or yard, when what proportion of dogs are kept in this environment is unknown. This suggests two points to consider in relation to the evidence for the importance of a garden. First, there is a deficit of research that has specifically investigated the relationship between the presence of a garden and whether or not a dog is relinquished. Second, in those studies that have identified broad categories of reasons for relinquishment (that may include having or not having a garden), the proportion of dogs relinquished for reasons related to a garden does not appear to be very high, so in the grand scheme of things it may not be such an important factor to consider in any case. Moreover, and perhaps most strikingly, Marinelli et al. (2007) reported that dogs living in large family homes with gardens were statistically *less likely* to be taken on long walks ($p < .01$), thus potentially preventing social interactions with unknown dogs and people. Frequency of long dog walks was used in the study as an indicator of a dog's quality of life, so this finding suggests that having a garden does not necessarily ensure a good quality of life for a dog. Dogs who are less frequently taken on long walks may also not receive a sufficient amount of exercise, so this would further affect their overall welfare. Because the presence of a garden could contribute to a dog's quality of life in different ways (e.g. socialisation, exercise, stimulation), additional research is needed to investigate the relationship between having a garden and specific aspects to gain a more complete understanding of how it affects quality of life.

There is some important and statistically significant evidence for including other aspects of accommodation as a theme in adopter screening assessments.

Patronek et al. (1996) reported that living in an apartment is associated with an increased risk for relinquishment (OR, 2.78; 95% CI: 1.36-5.63). Furthermore, the same study also reported that living in a mobile home is an even greater risk factor for relinquishment (OR, 3.54; 95% CI: 1.87-7.10). However, none of the respondents in this current study reported that an adopter living in a mobile home is a factor that would lead a potential adopter to be deemed unable to adopt a dog. Marston et al. (2004) found that of the 31.9% (996/3,123) of dogs relinquished for owner related reasons, 40.4% (403/997) were relinquished due to accommodation and moving. In that study, owner related reasons were the most common classification of reasons given, and accommodation and moving was the most common reason within that group, but the proportion of surrendered dogs for which reasons were not reported was even greater (34.2% [1,070/3,123]). Salman et al. (1998) found that "inadequate facilities" was a reason provided for 4% of dogs relinquished, which was the seventh most common reason reported, though it was not specified in the study exactly to what inadequate facilities referred. The fact that reasons for relinquishment were unreported for more than a third of dogs in Marston et al. (2004), and the proportion of dogs relinquished for "inadequate facilities" was so small in Salman et al. (1998) points to the possibility that the key issue or issues leading to relinquishment have little to do with accommodation.

In the *family* theme, there is some evidence (e.g. Diesel et al., 2008) to support the inclusion of minimum ages of children in the household as it pertains to risk for relinquishment. "No children <5 years old" and "no young children" were recurring issues of concern; the latter is vague but likely refers to children of about the same age. Diesel et al. (2008) reported that households with children <13 years old were at an increased risk for relinquishing a dog (OR, 1.8; 95% CI: 1.3-2.5), and

so, it might be more rational for organisations to expand the age group of children they enquire about in adopter screening assessments. This is not to suggest that organisations should prohibit households with children <13 years old from adopting a dog, but as with the other factors that are associated with an increased risk for relinquishment, such adopters and households may require additional support, especially post-adoption. As the presence of children in the home relates to a dog's quality of life, Marinelli et al. (2007) reported that the absence of children of any age in the home statistically *increases* owner attachment to the dog ($p = .03$), which the study used as an indicator of good quality of life for a dog. Although children in the home was not a "most important" characteristic reported by respondents in the current study (only ages of children in the home), the findings of Marinelli et al. (2007) suggests that their presence, regardless of age, negatively impacts a dog's quality of life. Because it seems that children in the home both increase a dog's risk for relinquishment and decrease their quality of life, households with children of any age may benefit from additional support post-adoption, and especially if the children in the home are <13 years old.

There is some evidence in the literature (Chen et al., 2013; Schalamon et al., 2006; Shuler et al., 2008; Weiss et al., 1998) to support the inclusion of minimum age requirements of children in the household on the basis of minimizing safety and liability risks, and these studies reported that the incidence rate of dog bites among children has been reported to be higher in children <10 years old. However, research has reported that the incidence rate of dog bites has significantly *decreased* among 0-4 year old children between 1994 and 2001-2003, from 24.9 per 1,000 children to 8.7 per 1,000 children ($p < .007$) (Gilchrist et al., 2008). There are several risk factors that are associated with dog bite risk in children (e.g. intact dogs

[Schuler et al., 2008]), as well as other factors that could be contributing to the decrease in the incidence rate (e.g. a longstanding public emphasis on paediatric dog bite prevention [Gilcrhist et al., 2008]), but nonetheless this shift possibly suggests that minimum ages of children in the household do not need to be given as much weight in assessments as they did in the past. Perhaps leaving them as a "most important" characteristic but not a factor that would lead an adopter to be deemed unable to adopt a dog would be more appropriate. Additionally, while specific minimum age requirements of children (i.e. <4 years old, <5 years old) were reported by some respondents in the current study as a "most important" characteristic, "no young children" is vague and subjective, so it is challenging to determine whether any evidence in the literature pertaining to specific age ranges of children is relevant. For example, Gilchrist et al. (2008) reported a higher incidence rate of dog bites among 10-14 year old children than among 0-4 year old children (12.2 per 1,000 children and 8.7 per 1,000 children, respectively). Similarly, Chen et al., 2013 reported two age groups of children who suffered dog bites were significantly more likely to have known the dog: 0-5 year old children *and* 6-12 year old children ($p < .0001$; .0018, respectively), so based on the findings of these studies, it seems organisations should consider all children <15 years old to be young. As such, this adds further support to the previously noted recommendation that households with children of any age would benefit from additional post-adoption support, which in this case should specifically focus on supporting adopters to decrease the risk of injury to children (e.g. appropriate types of child-dog interactions).

All five of the characteristics that comprise the theme relating to *work/lifestyle* were reported by respondents as also being factors that would lead a

potential adopter to be deemed unable to adopt a dog, yet there is no significant evidence to support their inclusion in adopter assessments. Four of these ("amount of time dog is alone during day", "must not be alone for >4 hours", "must not be alone for >5 hours", and "lifestyle changes") are mentioned in the scientific literature (Diesel et al., 2008; Diesel et al., 2010; Marston et al., 2004; Salman et al., 1998; Scarlett et al., 1999; Vučinić et al., 2009), but only at a descriptive level, with none of the studies calculating an increased risk for relinquishment associated with these characteristics. There is the possibility that at least some of these characteristics are s associated with an increased risk for relinquishment but no studies have evaluated this yet. The fact that Diesel et al. (2010) reported that nearly a quarter of relinquished dogs were left alone for 4-6 consecutive hours may point to the plausibility of a significantly increased risk of relinquishment associated with the amount of time a dog is left home that has just not yet been evaluated. Rehoming organisations seem to place a lot of emphasis on this theme, and so this area should be a priority for future research.

There are at least three issues relating to the importance of asking about whether a potential owner has the financial means to care for a dog. First, "financial means" is a very relative concept dependent on a myriad of factors, and is therefore challenging to quantify. Second, such studies look at income ranges (e.g. Patronek et al., 1996), which are also very relative and dependent on things such as cost of living. Knowing a surrendering owner's approximate income does not necessarily tell much about their financial means to care for a dog. Lastly, the relationship between income levels and allocation of income for the care of the dog is not a direct one. Although Kwan and Bain (2013) did collect data on surrendering owners' incomes, they reported that finances did not strongly influence reasons for

relinquishment based on the fact that owners who reported finances as a reason for relinquishment were as statistically likely to have another dog remaining in the home as owners who did not report finances as a reason for relinquishment. Thus, it makes little sense for "financial means" to be a "most important" characteristic in adopter screening assessments, much less for it to be a factor that would lead a potential adopter to be deemed unable to adopt a dog.

There are other *expectations* noted in the literature, which may be more important to assess. Patronek et al. (1996) reported that if the work caring for a dog was more than expected, they were at a statistically significant increased risk for relinquishment (OR, 5.77; 95% CI: 3.25-10.25). Moreover, the study noted that a greater proportion of owners who had obtained their dog from a shelter reported that their dog had been more work than expected compared to owners who obtained their dog from other means. Diesel et al. (2008) also reported that owners who found the work and effort in caring for a dog to be more than expected had a statistically significant increased risk for relinquishing their dog (OR, 9.9; 95% CI: 4.1-24.6). Diesel et al. (2010) found that 35.9% (1,009/2,806) of surrendering owners reported that their dogs were more work than expected. Likewise Scarlett et al. (1999) found that "poor preparations and inappropriate expectations" was one of the most common classes of reasons for relinquishment cited and accounted for 13.5% (276/2,045) of dogs. A deficit in owner knowledge about dog care and behaviour may contribute to unrealistic owner expectations and the time required to look after a dog so that it is not a problem (New et al., 2000; Scarlett et al., 1999). These findings would suggest that perhaps greater attention in adopter screenings should be given to ensuring an adopter has sufficient good knowledge of dog behaviour and care (i.e. knowledge rooted in scientific literature) and the time and resources

involved in the care of dog, as this would likely have a notable impact on the success of the placement.

The evidence to support the one characteristic in the *demographics* theme, "no adopters <21 years old", for which any could be found is quite limited. Diesel et al. (2008) reported that adopters < 25 years old were statistically significantly more likely to return a dog compared to adopters >50 years old. However, New et al. (2000) and Shore (2005) noted that the majority of surrendering owners were in their mid 20s to late 30s. This suggests that although not adopting to <21 year olds could remain a factor in adopter screenings, it does not need to be a criterion that would lead an adopter to be deemed unable to adopt a dog. A better approach might be to ensure that adopters in this age group have sufficient resources and support systems in place to assist with the care of the dog if need be.

There appears to be only limited evidence to support the one characteristic in the *experience* theme pertaining to a dog's quality of life, and there does not seem to be any evidence pertaining to risk factors for relinquishment for that characteristic. However, attachment between the dog and owner was the only metric in the study that was significantly increased by an owner's previous experience with pets (Marinelli et al., 2007). While the level of attachment between dog and owner may have a role in a dog's quality of life, there are other many other components contributing to quality of life and welfare to consider. Despite this, this was the only characteristic in any theme for which any evidence pertaining to quality of life could be found. This does not necessarily mean that other characteristics included in the screening process do not affect a dog's quality of life, but rather that they just have not yet been investigated in the academic literature, so this is deserving of future research attention.

There does not appear to be any evidence to support the characteristics relating to the *education* of an owner, and so it is difficult to justify including them as important aspects within adopter screenings. However, as previously discussed, an emphasis on ensuring an adopter has appropriate knowledge as part of the screening process would be beneficial, so the importance of this theme should not be discounted altogether. Similarly, the notable amount of evidence to support *awareness of needs* as a "most important" characteristic further emphasizes this.

Although these characteristics (sub-themes) were grouped by theme in this study, they have still largely been considered individually, which follows suit with how they are reported in the scientific literature reviewed (see Table 2.1); reasons for relinquishment or characteristics of surrendering owners are typically listed individually, but similar ones may be grouped together. However, by considering them in this manner, a key aspect can easily be ignored: the interaction between the characteristics. Moreover, it is important not only to consider which relationships or interactions exist between various characteristics, but also how they interact. For example, although as previously described "financial means" is challenging to quantify, it could be argued that an adopter who lives in an apartment has less financial means and thus cannot afford to live in a larger accommodation type, such as a house with a private garden. While there may well be a relationship between these two characteristics, it may actually be the adopter has *greater* financial means because they have allocated less resources to their accommodation type, and thus can better meet the needs of a dog. Similarly, there may be a relationship between accommodation type and the presence of young children in the home. Adopters with young children may be more likely to live in a house with a fenced garden rather than in an apartment. Future research evaluating risk factors for

relinquishment, human safety risks, and dogs' quality of life should investigate potential interactions or relationships between factors, as it may be that specific combinations of them significantly affect relinquishment risk, safety risk, or quality of life.

Aside from the evidence, or lack thereof, that could be found in the literature to support the inclusion of the "most important" characteristics for the three primary purposes described at the beginning of this section, it is also possible that organisations include the characteristics in accordance with relevant legislation. For example, The Animal Welfare Act 2006 outlines standards of dog ownership and care, such as the need for a suitable environment and a suitable diet, which may be influencing the types of information sought, and thus why some characteristics are included in assessments. Additionally, some organisations may have their own standards of dog ownership or care, which influence what is addressed in adopter screening assessments. This may be particularly true in the case of larger, multi-branch organisations (e.g. Dogs Trust). Future research could investigate the role of such factors in assessments by using a more focused approach of enquiry with organisations, such as with multiple choice questions (e.g. Are you aware of animal welfare legislation pertaining to responsible pet ownership, and if so, has it influenced the types of information you seek as part of adopter screening assessments?).

It is important to highlight how heavily owner reporting is relied on in studies that report or investigate reasons for relinquishment (see Table 2.7). There are a myriad of factors that can affect owners' reports (e.g. inaccurate memory, socially acceptable responses, the emotionally-charged experience of surrendering a dog). Unfortunately, only a very limited number of studies (Duffy, Kruger, &

Serpell, 2014; Segurson, Serpell, & Hart, 2005) have evaluated the quality of owner reporting in this context, and this presents another complication. Segurson et al. (2005) reports that relinquishing owners who believed that their questionnaire responses were confidential reported that their dogs displayed owner-directed aggression and fear of strangers significantly more frequently than those who believed their responses were not confidential. In contrast, Duffy et al. (2014) reports that relinquishing owners did not give unreliable or biased responses on a behavioural evaluation regardless of the confidentiality of their responses. However, both of these studies used versions of the same behavioural evaluation, the C-BARQ©, which is an owner-completed questionnaire designed to assess canine behaviour and temperament[11], including the prevalence and severity of behaviour problems ("Canine Behavioral & Research Questionnaire", 2019; Hsu & Serpell, 2003). As such, further investigation into the quality of owner reports is needed. In some cases owners may give multiple reasons for relinquishment, suggesting that possibly there have been ongoing and accumulating issues that have been a strain on the dog-owner relationship, but what might be "most important" to know is which one, if any, led to great enough conflict to lead to the dog being relinquished or whether it was the accumulation of events.

[11] The authors of this study did not provide a specific definition for "temperament" in this context.

Table 2.7

Most common reasons for relinquishment reported in the academic literature[1]

Reason	Risk factor[2]	Prevalence in relation to relinquishment by study
Accommodation/moving/landlord issues	√	40.4% (403/997) (Marston et al., 2004)[3] 35% (28/80) (Kwan & Bain, 2103) 16.0% (26/162) (Dolan et al., 2015) 12.0% (338/2,806) (Diesel et al., 2010) Moving: 12%[5] (Carter & Taylor, 2017) 12%[5] (Carter & Taylor, 2017) 9.5% (63/662) (Diesel et al., 2008) Moving: 7% (341/3,676) (Salman et al., 1998)[3, 4] Landlord: 7% (322/3,676) (Salman et al., 1998)[4] 4.4% (10/229) (Chen et al., 2012)
Lack of time for dog/dog needs more attention than can be given	√	53% (42/80) (Kwan & Bain, 2013) 28.2% (794/2,806) (Diesel et al., 2010) 20.5% (32/156) (Vučinić et al., 2009) 17.7% (176/997) (Marston et al., 2004) 15.5% (103/662) (Diesel et al., 2008) 10.5% (24/229) (Chen et al., 2012) 9.4% (193/2,045) (Scarlett et al., 1999)[3] 8.8% (27/307) (Mondelli et al., 2010) 4% (212/3,676) (Salman et al., 1998)[4]
Problematic behaviours (unspecified)	√	65% (52/80) (Kwan & Bain, 2013)[3] 58.6% (388/662) (Diesel et al., 2008)[3] 34.2% (959/2,806) (Diesel et al., 2010)[3] 31.9% (73/229) (Chen et al., 2012)[3] 15%[5] (Carter & Taylor, 2017)[3] 11.5% (9/78) (Shore, 2005) 4.9% (8/162) (Dolan et al., 2015)
Allergies in family		10.3% (8/78) (Shore, 2005)[6] 4.2% (86/2,045) (Scarlett et al., 1999) 3.4% (22/662) (Diesel et al., 2008) 1.3% (3/229) (Chen et al., 2012)
Financial problems/cost	√	71.0% (115/162) (Dolan et al., 2015)[3] 36% (29/80) (Kwan & Bain, 2013) 26.9% (42/156) (Vučinić et al., 2009)[3] 5% (224/3,676) (Salman et al., 1998)[4]
Personal or family reasons		14.6% (45/307) (Mondelli et al., 2004) 7.5% (154/2,045) (Scarlett et al., 1999)
Child-pet conflict	√	14.1% (11/78) (Shore, 2005) 3.1% (64/2,045) (Scarlett et al., 1999)
Problems with other pets	√	14.1% (11/78) (Shore, 2005)[3] 9.4% (29/307) (Mondelli et al., 2004)
Owner ill/health issue		13.4% (134/997) (Marston et al., 2005) 4.8% (137/2,806) (Diesel et al., 2010)
Inadequate housing condition for dog		12.2% (19/156) (Vučinić et al., 2009) 4% (198/3,676) (Salman et al., 1998)[4]
Relationship breakup		4.7% (133/2,806) (Diesel et al., 2010) 2.3% (15/662) (Diesel et al., 2008)
Aggression (general)		47% (38/80) (Kwan & Bain, 2013)
Escapes		24.3% (82/338) (Marston et al., 2004)

Reason	Risk factor[2]	Prevalence in relation to relinquishment by study
Hyperactive	√	20.4% (69/338) (Marston et al., 2004)
Aggression toward people	√	14.9% (46/307) (Mondelli et al., 2004)[3]
Owner lifestyle change		11.5% (18/156) (Vučinić et al., 2009)
Elimination problems	√	10.3% (8/78) (Shore, 2005)
Dogs' sickness/medical issues		10.0% (23/229) (Chen et al., 2012) 3.7% (Dolan et al., 2015)
Disobedient behaviour		9.4% (29/307) (Mondelli et al., 2004)
Too many pets in household		8%[5] (Carter & Taylor, 2017)
New member in household		7.1% (11/156) (Vučinić et al., 2009)
Other		4.3% (7/162) (Dolan et al., 2015)
Dog has grown bigger than expected	√	2.7% (18/662) (Diesel et al., 2008)
New baby		2.3% (47/2,045) (Scarlett et al., 1999)
Characteristics of the caretaker (owner)		2%[5] (Carter & Taylor, 2017)

[1] Five most common reasons reported in each study
[2] Reasons for which there is statistically significant evidence that such factors are associated with an increased risk of relinquishment
[3] Most common reason reported in the study
[4] Although they are not equal, the percentage and proportion are as reported in the study
[5] The study reported the total sample size for owners relinquishing companion animals (dogs and cats), but it did not report the sample size for just those relinquishing dogs, so the proportion is unknown (see Table 2.1)
[6] Was grouped with owner illness in study

Aside from the evidence (or lack thereof) pertaining to risk factors to relinquishment found in the academic literature to justify including the "most important" characteristics for relinquishment as part of the adopter screening assessments, it is possible that a number of characteristics are included for the purpose of ensuring a dog's good quality of life and overall well-being. Additionally, it is very important to note that a dog staying in a home does not necessarily mean that a placement has been successful, so if the focus is shifted from this being the core definition of a successful placement to evaluating a dog's quality of life then there may be greater evidence for including the characteristics reported here in adopter screening assessments. The question then becomes how is quality of life in dogs best assessed, which is undoubtedly challenging to evaluate, as it should encompass both conscious abuse and unconscious inadequate care. There is currently extremely limited research pertaining to the assessment of quality

of life in dogs in a non-clinical population. As such, this would be a useful focus for future academic research.

There are concerns over the quality of the practical execution of adopter screening assessments, which largely are due to issues of subjectivity and standardisation. Based on the low levels of standardisation in home visits and interviews coupled with the range of people who conduct both, it is likely that there are frequent and possibly grave inconsistencies in their practical execution, which therefore would suggest that the quality of the execution is dubious. Moreover, of the organisations that have completely standardised home visits, a considerable proportion (46.9%) requires whoever is conducting the home visit to make subjective judgements about the suitability of the adopter and their environment. Because one person may conduct the home visit and another person may conduct the rest of the screening process, there is further opportunity for inconsistencies in the overall assessment. This is further cause for concern in terms of the quality of practical execution of adopter screening assessments.

Table 2.8

"Most important" characteristics that are reported in the literature as reasons for relinquishment or characteristics of surrendering owners

Reason/characteristic	Total number of studies mentioned in	Number of studies with reported evidence
Financial means*	6	2
Living in a flat or apartment*	5	2
No adopters <21 years old*	5	2
Minimum age requirement of children in the household*	2	1
No children <4 years old*	2	1
No children <5 years old*	2	1
No young children*	2	1
No kennels or outside buildings/dog must life indoors*	1	1
Lifestyle changes	9	
Awareness of needs	6	
All members of household must want dog	3	
Amount of time dog is alone during day	2	
The presence of a garden	2	
Landlord issues	2	
Secure garden	1	

*Denotes risk factors (i.e. reasons for which there is statistically significant evidence that such factors are associated with an increased risk for relinquishment)

The findings of the current study suggest that organisations invest considerable resources into screening potential adopters, and aim to gather a wide range of information about them and their families, lifestyle, and environment. It should be noted that a bias is possible due to the means by which the participating organisations were recruited (i.e. members of the ADCH). They may represent the *upper crust* of rehoming organisations. That aside, many of these organisations employ strict criteria that prohibit adopters from rehoming any dog, but there is a considerable lack of research to investigate whether there is a relationship between adopter assessments and rehoming success. Weiss et al. (2014b) compared the quality of care given to adopted dogs and dog-owner attachment between two groups of adopters: those who had adopted a dog via a policy-based approach (i.e. strict criteria employed by an organisation, and those who adopted via a conversation-based approach (i.e. without strict criteria). The study found that there

was no significant differences between the two groups; dogs rehomed through either means are just as likely to have a high quality of care and to have adopters who are highly bonded to them. This study was a step in the right direction of filling this research gap, but additional research is needed, specifically to investigate rehoming success over a longer time period post-adoption, i.e. up to one year post-adoption, as dogs are at increased risk for relinquishment for that entire period (Diesel et al., 2008).

In this study, a total of 37 "most important" characteristics were identified, and 31 of them could prevent a potential adopter from adopting a dog. However, the academic literature does not provide an abundance of evidence to support this. In fact, evidence could only be found in the literature for 12 of the characteristics. An increased risk for relinquishment is associated with eight of these characteristics (see Table 2.8), and a risk to human safety is associated with the remaining four of them. It is possible that the purpose of including at least some of the remaining characteristics in adopter assessments is to ensure a good quality of life for a dog, but there is a lack of research on dogs' quality of life to provide such evidence. Therefore, it seems that organisations' screening assessments may be inefficient, and could be refined considerably. A first step would be to omit factors for which there is no scientific evidence to support their inclusion or to monitor cases to establish if these are important. Furthermore, a large proportion of the factors that are included in assessments could lead an adopter to be deemed unable to adopt a dog, so by having such strict and rigorous criteria, organisations are potentially turning away many adopters who would provide a suitable home for a dog. Until necessary research is conducted to assess if at least the most common factors included in assessments are associated with an increased risk for relinquishment,

with a dog's quality of life, or with an increased risk to human safety, it could be argued that organisations should relax their strict screening criteria, which would likely increase the number of dogs placed into homes. This would allow organisations' resources to be more usefully allocated, which may ultimately decrease the number of dogs in shelters that are euthanized each year. In the next chapter the dog assessment element of the rehoming process is considered using a similar methodology.

Chapter 3

Dogs that are in the care of rehoming organisations often undergo some type of temperament, behaviour, or personality test prior to rehoming, or to do determine if they are believed to be suitable for rehoming whatsoever. Therefore, such tests can carry a considerable amount of weight in determining the fate of a dog. While the evaluation of the validity and reliability of such tests is important, an aspect of these evaluations that is equally important deals not with which tests are employed and if they are useful, but rather what types of information about a dog rehoming organisations aim to gather from any test or assessment, which thus far has received little, if any, research attention. As such, the aim of this chapter was to conduct a qualitative analysis of rehoming organisations' pre-adoption dog screening practices. In order to do this, a written enquiry was sent to rehoming organisations in the UK and the US. A total of 73 respondents provided information. Using a thematic analysis, nine themes emerged from the types of information respondents aim to gather from pre-adoption dog screening assessments; within those themes, a total of 71 sub-themes were created. The majority of respondents reported that they more highly value or give greater weight to some parts of assessments than others. The majority of respondents were also identified as having a *pass/fail* assessment scoring system, i.e. one in which the presence of certain characteristics in a dog would lead them to be deemed unadoptable. Forty-two characteristics were identified as being "most important", which includes those that could lead a dog to be deemed unadoptable. On the basis of an increased risk for relinquishment, a dog's quality of life, or a risk to human safety, evidence in the scientific literature to support the inclusion of any of the 71 sub-themes and one theme, which was in itself

a “most important” characteristic, was found for eight of them. The majority of respondents conduct assessments for all dogs pre-adoption. It is possible that there is justification for the inclusion of additional characteristics, but they have just not yet been scientifically evaluated. However, until this is done, organisations should consider shifting their focus and resources to post-adoption support and care, for which there is scientific evidence to support its importance in the success of a placement.

3.1. Introduction

Animal shelters and rehoming organisations seek to rehome as many dogs as possible, and one of the tools commonly used to aid in this process are temperament, behaviour, or personality tests to screen dogs pre-adoption. There is wide variation in the types of such assessments, and organisations’ dog screening policies and procedures can vary widely (e.g. who conducts the assessments, when are they done, are they standardised within the organisation). A considerable body of research in several countries has focused on examining these tests, often in terms of their reliability and validity.

Poulson et al. (2010) evaluated the predictive validity of a behavioural assessment used by a rehoming organisation in Australia. The study reported that the behavioural assessment in question was unable to predict specific behaviours, such as aggressive tendencies toward conspecifics and escaping tendencies, which suggests that the assessment is not particularly useful for its intended purpose. Mornement et al. (2010) investigated a cross-section of behavioural assessments used by a series of animal shelters in Australia, both in terms of the assessment protocols themselves and whether the individuals conducting the assessments were confident in the protocols and their ability to administer them. The study reported

an overall low level of standardisation in the administration of assessments, and it reported a complete lack of standardisation between shelters as to when dogs are tested pre-adoption. The study also reported considerable variation in assessments' scoring protocols, as well as a lack of consistency in terms of the interpretation of behaviour observed and the in the interpretation of the results of each dog's assessment. None of the assessments reviewed in the study had been scientifically validated, so the authors noted that they could not comment on their effectiveness, and while some shelters may use assessments for which there has been scientific validation, they modify them to fit their needs and/or have not received adequate training for administration, so they may no longer be valid. Marder et al. (2013) evaluated the predictive validity of a behavioural test used at a rehoming organisation in the US specifically in terms of its assessment of food aggression in dogs. The study reported a statistically significant association between the presence of food aggressive behaviours in dogs pre-adoption and the presence of those reported by owners post-adoption. The positive predictive value of this (i.e. dogs classified as food aggressive pre-adoption were also classified as such post-adoption) was weak, but the negative predictive value (i.e. dogs classified as not food aggressive pre-adoption were also classified as not food aggressive post-adoption) was strong, thus suggesting that the assessment has some predictive usefulness. Dowling-Guyer et al. (2011) examined the ability of a behavioural test used by rehoming organisations in the US to detect elements of canine personality[12]. The study reported that there is evidence that the particular behavioural test was able to detect underlying elements of canine personality, and therefore can be used to

[12] The authors of this study define "personality" as, "*the characteristics (i.e., traits) of an individual that describe and motivate consistent patterns of thoughts, feelings, and behaviors that persist across time and situations and that differentiate one individual from another*".

identify stable behavioural tendencies, which, per the authors, would aid in dog placements.

As evidenced by these studies, there are conflicting reports on the validity and reliability of dog assessments used pre-adoption, and thus this calls into question their overall usefulness. However, while there is a notable amount of research that has been conducted to evaluate these aspects of assessments, research has not specifically focused on investigating what sorts of information organisations aim to gather from pre-adoption dog assessments, regardless of what type of screening tool they use. Additionally, little is known about the practical execution of assessments. Although Mornement et al. (2010) did evaluate some aspects of the practical execution of assessments (e.g. their scoring), this is a specific aspect of assessments that warrants additional research attention, especially because as the study noted, there appears to be considerable variation in how even the same test is executed. Gaining insight into these aspects of dog assessments are initial steps toward understanding what information about a dog is most useful in both rehoming a dog and increasing the likelihood that it is a successful placement, which could also lead to improving the efficiency of organisations' dog assessments. Moreover, gaining a further understanding in the practical execution of assessments would help to determine whether organisations are appropriately equipped to conduct assessments appropriately in general. Therefore, the aim of this study was to conduct a qualitative analysis of rehoming organisations' pre-adoption dog screening policies.

3.2. Methods

The same list of dog rehoming organisations in the UK compiled via The Association of Dogs and Cats Homes website that was used in Chapter 2 was also

used for the current study. Organisations were contacted between 5 February 2016 and 1 July 2017. In addition, a list of dog rehoming organisations in the US was compiled via the Petfinder website (www.petfinder.com/animal-shelters-and-rescues/) in August 2014. All organisations were only contacted electronically but in a similar manner to the way used previously; electronic enquiries were sent via email and/or using the "direct contact form" on the organisations' websites. Organisations with multiple centres or branches were contacted individually where listed with separate addresses on their website. The same written enquiry was sent to all organisations in the UK and the US (n=497) (see Appendix B for full written enquiry). A total of 249 organisations in the UK were contacted, which was comprised of 89 individual organisations and 162 branches. Six of the individual organisations were multi-branch, and four of those had head offices that were contacted in addition to the branches. A total of 247 organisations in the US were contacted; they were all individual organisations without any branches. In the enquiry organisations were asked about their pre-adoption dog assessments, such as those concerned with gauging temperament, personality, or behavioural characteristics. This study sought to collect data about what information organisations aimed to gather about the dogs from the assessments, not what type of assessments they performed (e.g. Match-Up Behavior Evaluation [Dowling-Guyer et al., 2011], Canine-ality™ Assessment [www.aspcapro.org/resource/saving-lives-adoption-programs-behavior-enrichment/what-canine-ality]). Any other pre-adoption dog assessments, such as veterinary checks were also not of interest. As such, in the written enquiry organisations were asked:

1. "Do you assess the dogs in any manner prior to adoption, such as in terms of their temperament, personality, or behavioural characteristics?

2. If yes, are all dogs that are part of the organisation assessed?
    a. If no, why not?
3. Is there a form or document that is completed as a part of the assessment?
    a. If yes, would you be willing to please send me a copy of it (preferably via email or to the above postal address)?
4. What information about the dog (e.g. specific behaviours, personality characteristics, etc.) are you aiming to gather from the assessment? Please provide as much detail as possible.
5. Are any aspects of the assessment given more weight or value than others?
    a. If yes, what are they?
6. Would any results attained from the assessment result in a dog being deemed unadoptable?
    a. If yes, what are they? Please provide as much detail as possible.
7. Is there anything else about the assessments of dogs conducted in your organisation that you would like to add?"

They were also given the option to discuss their responses to the enquiry over the phone. Organisations were permitted to provide as much detail and information as they chose in their responses, and they were welcomed to provide any supplementary documents (e.g. dog assessment forms).

The information that was collected from organisations was recorded in an Excel spreadsheet. Responses were collated into columns based on the 11 questions asked in the written enquiry. It was also noted if they provided relevant supplemental material, and if so, what type. The same procedural framework for thematic analysis (Braun & Clarke, 2006) was used in this part of the study. The data set was determined by what was relevant to four questions, linked to the aim, to

conduct a qualitative analysis of rehoming organisations' pre-adoption dog screening policies:

1. What information or characteristics about a dog are "most important"?
2. What information or characteristics about a dog would lead him/her to be deemed unadoptable?
3. What evidence is in the scientific literature to support the inclusion of the any of the characteristics as part of dog screening assessments?
4. What is the quality of the practical application of a dog screening assessments?

In order to address the first question, the "most important" characteristics about a dog were determined first by factors that were reported as given more weight to in assessments. To answer the second question, organisations' usage of a *pass/fail scoring* system was initially identified, which was followed by identifying what characteristics in a dog would lead them to be deemed unadoptable (*necessary criteria*). Those characteristics were also considered "most important", but in order to differentiate them, they are specifically referred to as characteristics that would lead a dog to be deemed unadoptable. As such, all factors that would lead a dog to be deemed unadoptable are "most important" characteristics, but not all "most important" characteristics are factors that would lead a dog to be deemed unadoptable. In order address the third question, to determine if there is any scientific basis for the inclusion of the factors that are addressed or the types information sought during dog screening assessments, the scientific literature was reviewed for the same three purposes as in Chapter 2:

1. to identify whether any statistically significant increased risks for relinquishment were associated with these factors were reported,

2. to identify whether any of these factors were statistically associated with a dog's quality of life or overall welfare, and
3. to identify whether any of these factors could be associated with an increased risk to human safety.

The foci of the literature reviewed for these three purposes were the same as in Chapter 2 (see section 2.2 and Table 2.1). The final question was answered by assessing two aspects of the data set: if all dogs in an organisation are assessed, and if not, why not, and is there information being gathered during assessments that was not reported as being highly valued, and if so, then why was it being gathered.

Once the data set was extracted, it was organised into columns in the spreadsheet so that themes could be created. This process was again done using a "bottom up" or inductive approach. The data pertaining to what information dog rehoming organisations stated that they were aiming to gather from assessments was first analysed and organised in this manner. The supplementary material that some organisations provided was also analysed to determine what factors or characteristics were assessed in dog assessments. Similar factors that appeared to be related and assessing the same constructs (e.g. a dog's behaviour around people) were grouped together to form a theme. The analysis proceeded by creating sub-themes, which were determined on the basis of three criteria:

1. the frequency of participants' responses regarding what information they aim to gather from assessments,
2. what respondents reported as the "most important" or highly valued information or characteristics (e.g. a dog's behaviour outside or in the garden), or

3. the presence of a characteristic in a dog that would lead him/her to be deemed unadoptable (e.g. a dog who bites). In this case, these factors may only have been stated by one organisation, but their necessity in the screening process and the significance of implications for a dog warranted them becoming a sub-theme in their own right.

Creating sub-themes was a multi-stage process that involved reading and re-reading the data set multiple times at different points in the analysis. This was also necessary to deal with differences in semantics and terminology used by organisations with the goal of ensuring that there was not redundancy in sub-themes. As such, sub-themes were added and subtracted as necessary. Two tiers of sub-themes were created; differentiation between the tiers was based on the specificity of the factors. Themes encompassed large constructs, and the tiers of sub-themes progressively addressed more specific factors or characteristics. The terms "characteristics" and "factors" are used interchangeably in the following text in this regard.

3.3. Results

Responses to the written enquiry with information about their pre-adoption dog screening policies and procedures were received from a total of 73 respondents (UK: n=45, US: n=28), which was 14.7% of the total sample of organisations to which the enquiry was sent. Of the 73 respondents, 19 (26.0%) were multi-branch organisations, and 54 (74.0%) were single-site organisations. Twenty-three of the 73 respondents (31.5%) were breed-focused organisations[13], and one (1.4%) only dealt with senior dogs. 71/73 respondents (97.3%) reported that they conduct some type of pre-adoption assessment on their dogs, and thus 71 full responses were

[13] Refers to an organisation that entirely or mostly rehomes a specific breed (or breed mix), or a specific type of dog (e.g. small dogs)

received[14]. The two organisations that do not conduct assessments were both single-site organisations; one was in the US, and the other was a breed-focused organisation in the UK.

31/71 (43.7%) of the respondents use some type of form in their assessments; of those in the US, 4/27 (14.8%) use some type of form, and of those in the UK, 27/44 (61.4%) use them. Of those in the UK that use some type of form, 9/27 (33.3%) were multi-branch organisations, and 18/27 (66.7%) were single-site organisations. (All organisations in the US were single-site.) Of all those that use some type of form, 6/31 (19.4%) were breed-focused organisations, and 25/31 (80.6%) were not. 32/71 (45.1%) of the respondents do not use some type of form; of those in the US, 19/27 (70.4%) do not, and of those in the UK, 13/44 (29.5%) do not. Of those in the UK that do not use some type of form, 8/13 (61.5%) were multi-branch organisations, and 5/13 (38.5%) were single-site organisations. This information was unknown for 8/71 (11.3%); of those in the US, it was unknown for 4/27 (14.8%), and of those in the UK, it was unknown for 4/44 (9.1%). 28/71 (39.4%) of the respondents provided relevant supplemental information, which was divided into two categories: dog assessment forms and surrendering owner forms. Dog assessment forms were those used by an organisation to conduct an assessment in terms of aspects such as behaviour, temperament, or personality. The forms often included instructions for conducting the assessments and space to indicate how the dog performed in the assessment. Surrendering owner forms were those completed for dogs who were being relinquished to the organisation for rehoming. On the forms the surrendering owner was asked a series of questions similar to those on the dog assessment forms, i.e. regarding a dog's behaviour, temperament, or

[14] Respondents were not required to answer all questions in the enquiry, so any respondent who reported that they conduct pre-adoption dog assessments and answered at least some of the subsequent questions was counted as a full response.

personality. Both forms may also have included items pertaining to other aspects of a dog, such as their medical or veterinary history and current needs. Such items were not considered further. Similarly, non-relevant supplemental information provided by respondents included medical or veterinary forms and potential adopter screening forms; this information was also not used. Eighteen respondents provided dog assessment forms; six provided surrendering owner forms; and four provided both forms. These forms were used in conjunction with respondents' answers to the questions on the written enquiry to address the four elements that comprised the objectives of this study.

3.3.1. What information or characteristics about a dog are "most important"?

Nine themes emerged from the analysis (see Table 3.1).

Table 3.1

Themes present in pre-adoption dog assessments

Theme	Definition
Aggression	Any type of a dog's behaviour that could be classified as potentially harmful or dangerous
Behaviour around dogs	A dog's behaviour in the presence of or toward another dog or dogs, which includes purported evidence, or lack thereof, of sociability toward dogs
Behaviour around other animals	A dog's behaviour in the presence of or toward an animal or animals of another species
Behaviour around people	A dog's behaviour in the presence of or toward a person or people, which includes purported evidence, or lack thereof, of sociability toward people
Behaviour in or reaction to specific situations or environments	A dog's behaviour when in specific and likely common situations that they may experience in everyday life and once rehomed (e.g. behaviour when traveling in a car)
Behaviour in situations involving touching or handling	A dog's behaviour when in likely common situations that would involve him/her being touched or handled in a variety of ways by familiar and/or unfamiliar people (e.g. behaviour when physically restrained)
Future home needs	Aspects of a dog's future home, both in terms of adopter/family structure and the physical residence, that are believed to be necessary for the dog based on reported information and/or observations (e.g. garden fence height)
Knowledge of basic commands and/or general training	Evidence of or a report of a dog performing basic commands (e.g. sit, stay, come) and/or other behaviours that are evidence of prior training (e.g. walking on lead behaviour)
Other	Miscellaneous sub-themes that were not relevant to the other themes, but were also not sufficient to create additional themes (e.g. sleeping behaviour and location)

Each theme contains a series of sub-themes organised in tiers based on the specificity of the factor (see Figure 3.1). Due to variations in terminology and semantics from organisation to organisation, context often had to be used to parse and interpret what underlying constructs were present to link the sub-themes that created themes. Moreover, identifying these underlying constructs was important for creating boundaries between the themes, i.e. what criteria differentiate one theme from another. This was particularly important for two of the themes, *behaviour in or reaction to specific situations or environments* and *behaviour in situations involving touching or handling*. There are several parallels and commonalities between the themes. However, the primary criterion that was used to differentiate the two is whether or not the dog is being physically touched or handled, often in different parts of their body and likely in a repetitive manner or over a period of time (e.g. while being groomed). Similarly, the theme called *aggression* had overlapping characteristics with other themes (e.g. a dog's behaviour around people could be labelled as aggressive); it was made its own theme due to the overall emphasis on its importance that was reported by respondents. The theme called *other* was created for factors that were not evidently related to the constructs represented by other themes. A total of 71 sub-themes within the nine themes were created (see Table 3.2).

46/71 respondents (64.8%) reported that they more highly value or give greater weight to some aspects of dog assessments than others; of those in the US, 15/27 (55.6%) do, and of those in the UK, 31/44 (70.5%) do. Of those in the UK that do, 12/31 (38.7%) were multi-branch organisations, and 19/31 (61.3%) were single-site organisations. Of all those that do, 16/46 (34.8%) were breed-focused organisations, and 30/46 (65.2%) were not. 11/71 respondents (15.5%) reported that

they do not more highly value or give greater weight to some aspects of dog assessments than others; of those in the US, 3/27 (11.1%) do not, and of those in the UK, 8/44 (18.2%) do not. Of those in the UK that do not, it was evenly split between multi-branch and single-site organisations. This information was unknown for 14/71 respondents (19.7%); of those in the US, it was unknown for 9/27 (33.3%), and of those in the UK, it was unknown for 5/44 (11.4%). Of the 71 sub-themes, 41 of those were rated as "most important" characteristics based on the factors reported by the 46 respondents as highly valued. However, there is one exception to this. The theme of *aggression* was a "most important" characteristic in itself, which makes a total of 42 "most important" characteristics (see Figure 3.1). In addition, all of the 22 sub-themes contained in *aggression* are "most important" characteristics, which was more than any other theme (see Table 3.2). The *other* theme had the most highly valued sub-themes. One theme, *behaviour in situations involving touching or handling*, did not include any sub-themes that were factors that would lead a dog to be deemed unadoptable or were reported as being highly valued.

Table 3.2

Number of sub-themes, tiers, and "most important" dog characteristics by theme

Theme	Number of sub-themes	Number of tiers	Number of "most important" characteristics
Aggression[1]	22	2	23
Other	13	2	6
Behaviour in or reaction to specific situations or environments	11	2	1
Behaviour in situations involving touching or handling	5	1	0
Future home needs	5	1	3
Knowledge of basic commands and/or general training	5	1	3
Behaviour around dogs	4	2	1
Behaviour around people	4	1	3
Behaviour around other animals	2	1	2
TOTALS:	71		42

[1] Aggression as a theme was a "most important" characteristic itself.

Those themes that contain fewer of the "most important" characteristics are not necessarily less important overall, but rather have fewer specific factors within the theme. For example, a respondent that rehomes greyhounds reported that, "*The most significant characteristic in relation to Greyhounds [sic] is the ability to live with cats and other small animals. So, the ability to tolerate cats is the principal characteristic recorded.*" This characteristic is clearly important to the respondent to assess, but it is broad in scope and is part of the *behaviour around other animals* theme, which had the fewest number of sub-themes.

Figure 3.1

Pre-adoption dog assessment themes and sub-themes

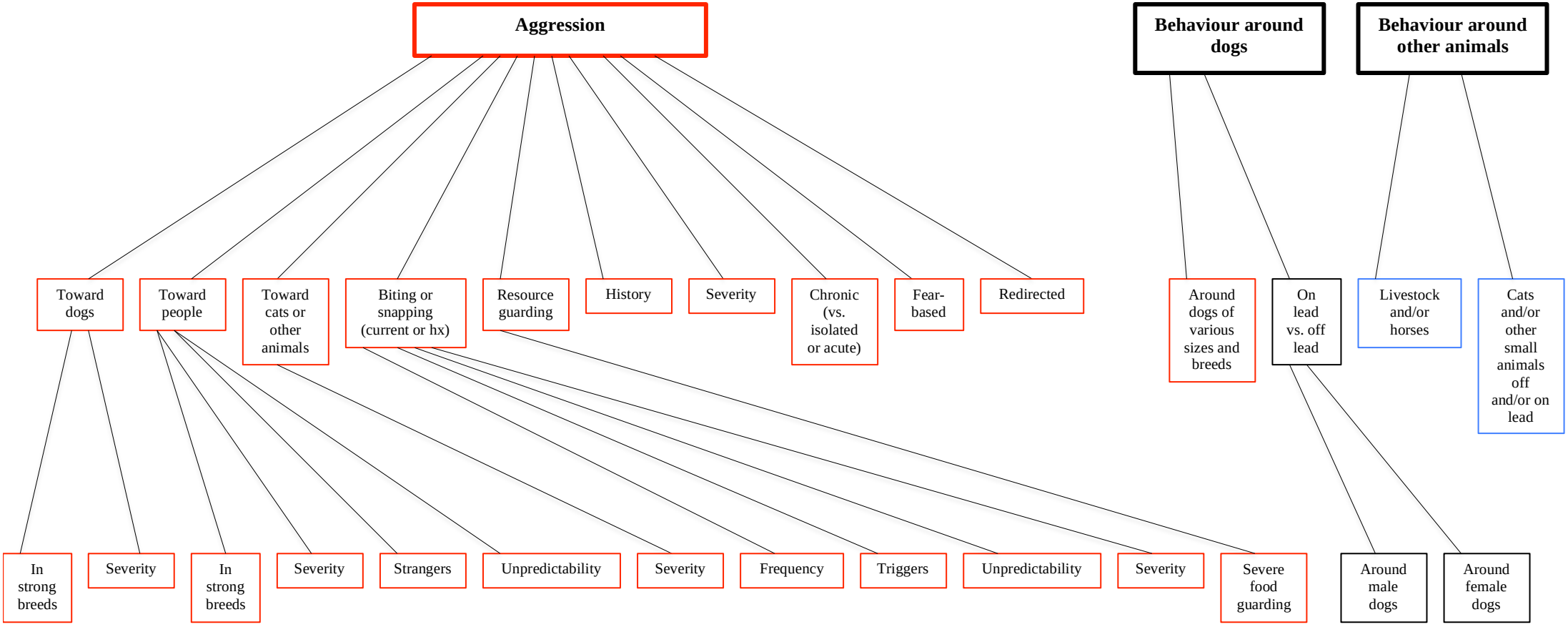


Figure 3.1 (continued)
Pre-adoption dog assessment themes and sub-themes

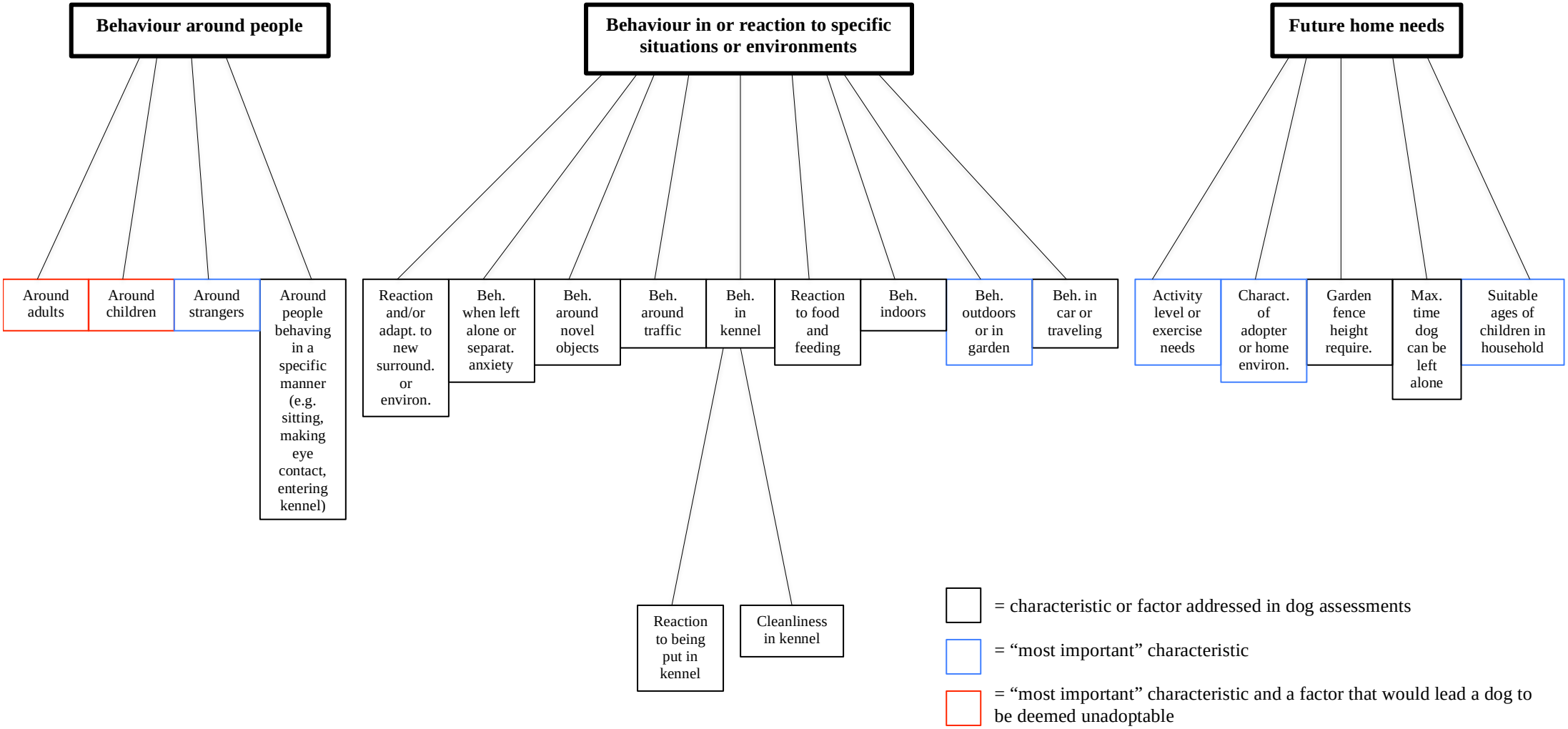
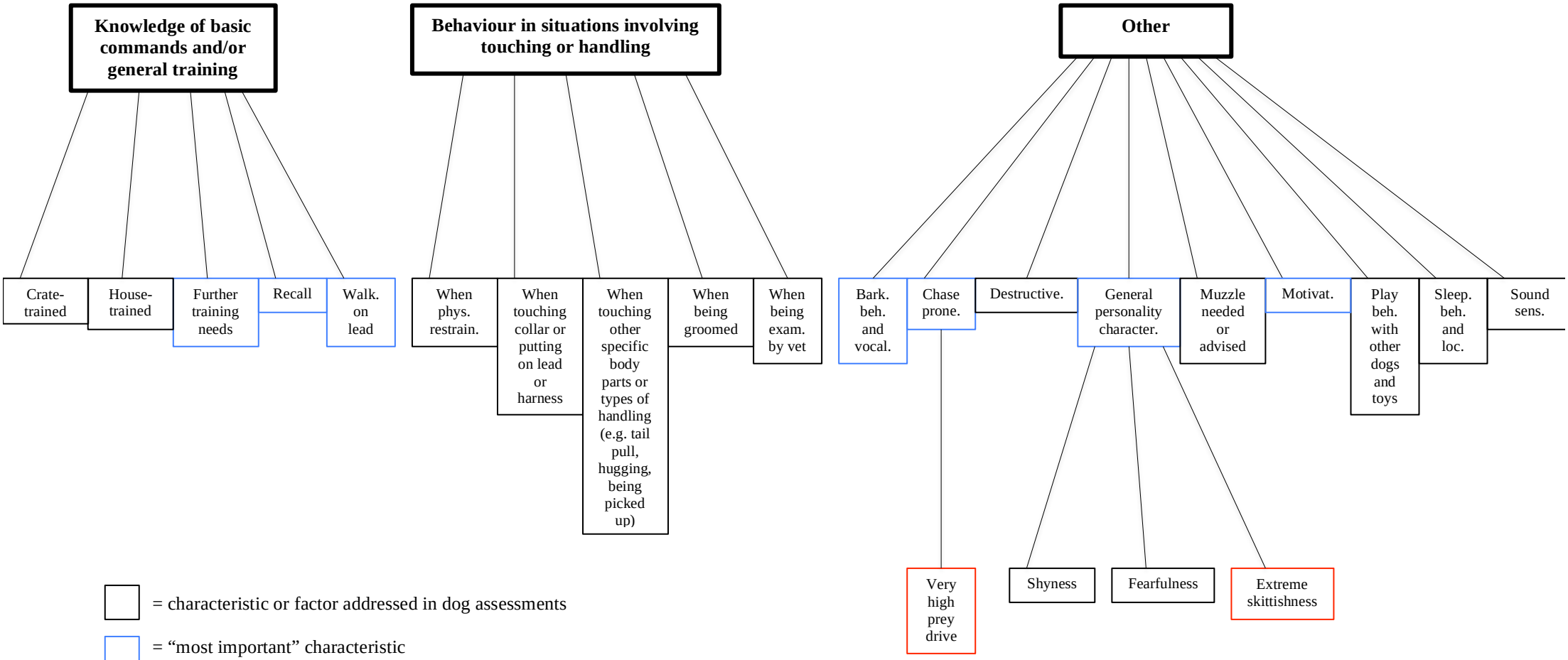


Figure 3.1 (continued)
Pre-adoption dog assessment themes and sub-themes



3.3.2. What information or characteristics about a dog would lead him/her to be deemed unadoptable?

Not all respondents reported that there are characteristics that would make a dog unadoptable, but for those that do, they were identified as having a *pass/fail* assessment system. 49/71 respondents (69.1%) were identified as using this type of assessment system at least in part; of those in the US, 17/28 (63.0%) use it, and of those in the UK, 32/44 (72.7%) use it. Of those in the UK that use it, 11/32 (34.4%) were multi-branch organisations, and 21/32 (65.6%) were single-site organisations. Of all those that use it, 14/49 (28.6%) were breed-focused organisations, and 35/49 (71.4%) were not. 14/71 respondents (19.7%) do not have it; of those in the US, 5/27 (18.5%) do not have it, and of those in the UK, 9/44 (20.5%) do not have it. Of those in the UK that do not have it, 6/9 (66.7%) were multi-branch organisations, and 3/9 (33.3%) were single-site organisations. It was indeterminable/unknown for 8/71 respondents (11.3%); of those in the US, it was indeterminable/unknown for 5/27 (18.5%); of those in the UK, it was indeterminable/unknown for 3/44 (6.8%). It should be noted that respondents were labelled as using this type of system only if they did so for non-medical reasons. For example, one respondent reported that they deemed a dog unadoptable who had a brain tumour, which resulted in the dog being euthanized. It should also be noted that unadoptable does not necessarily mean that the dog will be euthanized; it refers to any other outcome aside from the dog being rehomed, such as being placed in a long-term foster situation or remaining part of the organisation indefinitely. For respondents that have a *pass/fail* assessment system, some responses indicated that at least part of the reason for doing so was due to issues of public safety.

A total of 28/42 (66.7%) "most important" characteristics were found to lead a respondent to deem a dog unadoptable (see Figure 3.1). *Aggression* and all of its

22 sub-themes were the majority of the characteristics. The remaining five characteristics were part of three other themes: *behaviour around dogs, behaviour around people*, and *other*. Five of the themes did not contain any of these factors: *behaviour around other animals, behaviour in or reaction to specific situations or environments, future home needs, knowledge of basic commands and/or general training,* and *behaviour in situations involving touching or handling* (see Table 3.3).

Table 3.3

Number of factors that would lead a dog to be deemed unadoptable by theme

Theme	Number of factors
Aggression	23
Behaviour around people	2
Other	2
Behaviour around dogs	1
Behaviour around other animals	0
Behaviour in or reaction to specific situations or environments	0
Behaviour in situations involving touching or handling	0
Future home needs	0
Knowledge of basic commands and/or general training	0
TOTAL:	28

3.3.3. What evidence is in the scientific literature to support the inclusion of these characteristics as part of dog screening assessments?

Evidence in the scientific literature to support organisations' inclusion of any of the 71 characteristics (i.e. sub-themes and one main theme [*aggression*]) as part of their dog assessments was found in research that examined reasons for relinquishment or characteristics of dogs who were relinquished, research that assessed factors affecting dogs' quality of life, and research pertaining to issues of human safety associated with any of the sub-themes or main theme. In the first category of research, reasons for relinquishment were provided by surrendering owners; there may have been more than one reason provided depending on the policies of the organisations that participated in the studies or the design of the studies. Characteristics of relinquished dogs were also provided by surrendering owners, but the characteristics may not have been the reason(s) for relinquishment.

No evidence could be found in the scientific literature pertaining to the assessment of quality of life in dogs to support the inclusion of any of the sub-themes and one theme on the basis of dog welfare. Additionally, no evidence could be found in the scientific literature to support the inclusion of any of the sub-themes and one them on the basis of them being associated with an increased risk to human safety. Scientific research pertaining to reasons for relinquishment or characteristics of relinquished dogs, the only type of evidence that was found to support the inclusion of characteristics in assessments has been organised by theme below.

3.3.3.1. Aggression

Aggression has the greatest number of sub-themes, all of which are "most important" characteristics and all would also lead a dog to be deemed unadoptable, and one of them is the theme itself. Five of these characteristics were mentioned in the literature: "aggression", "aggression toward people", "aggression toward dogs", "aggression toward cats or another animals", and "biting or snapping (current or history)" (Diesel et al., 2008; Diesel et al., 2010; Kwan & Bain, 2013; Marston et al., 2004; Mondelli et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1996). Statistical evidence of an increased risk for relinquishment was reported in three studies (Diesel et al., 2008; New et al., 2000; Patronek et al., 1996) for all five of the characteristics.

Aggression: "Aggression", separate from any specific type (e.g. toward people), is mentioned in three studies (Kwan & Bain, 2013; Marston et al., 2004; Mondelli et al., 2004). However, it is only mentioned descriptively in the studies, and none provided statistical evidence that it is a risk factor for relinquishment. Kwan and Bain (2013) reported that aggression was a reason for relinquishment for 47% (38/80) of dogs. Mondelli et al. (2004) found that aggression was the second most

common reason for relinquishment, and was given as a reason for 14.9% (46/307) of dogs. Marston et al. (2004) found aggression to be a less common reason for relinquishment; it only accounted as a reason for 3.2% (~100/3,123) of dogs. Aside from aggression being reported as a reason for relinquishment or a risk factor for relinquishment, there is the concern of liability and the potential safety risk associated with aggression or aggressive behaviours that should be considered. One organisation reported that they will not accept dogs for this reason, "*…we will not accept a dog that is showing aggressive behaviour as it is a safety risk for staff, volunteers and potential adopters.*" Three other organisations reported that it is why aggression is a reason for deeming dogs unadoptable,

- "*We do not believe that agressive [sic] dogs are safe for society. If training does not stop agessive [sic] behaviour we deem them unadoptable.*"
- "*We are aiming to ensure that the dog is, overall, safe to rehome.*"
- "*…if dog shows aggression that would make it unsafe to rehome responsibly.*"

Aggression toward people: "Aggression toward people" is mentioned in four studies (Diesel et al., 2008; Diesel et al., 2010; Patronek et al., 1996; Salman et al., 1998). Two of the studies (Diesel et al., 2008; Patronek et al., 1996) provide statistical evidence for it being associated with an increased risk for relinquishment. The other two studies (Diesel et al., 2010; Salman et al., 1998) mention it only descriptively. Patronek et al. (1996) reported that dogs who displayed aggression toward people were associated with an increased risk for relinquishment. Dogs who were aggressive toward people on a weekly basis were 2.41 times (95% CI: 1.44-4.03) more likely to be relinquished, but those who were so on daily basis had a slightly lower increased risk; they were 2.14 times (95% CI: 1.25-3.66) more likely

to be relinquished. Diesel et al. (2008) reported that dogs who displayed aggression toward people were at a statistically significant greater risk for return. Compared to dogs without behavioural problems, those who displayed aggression toward people and had owners who had sought advice were 5.6 times (95% CI: 3.4-9.4) more likely to be returned, while those who had owners who did not seek advice had 11.1 times the risk (95% CI: 6.6-18.8). Diesel et al. (2010) noted that 6.4% (180/2,806) of relinquished dogs were reported by their surrendering owners to display aggression toward people, and 10.3% (290/2,806) were reported to display aggression toward people and at least one additional problematic behaviour. Salman et al. (1998) reported that aggression toward people was given as a reason for 9.8% (223/3,676)[15] of dogs. Safety concerns over aggression toward people were also reported, such as stated by one organisation, "*Some behaviours determine that a dog cannot be safely rehomed…it is more difficult to safely rehome a dog displaying aggressive behaviour towards children.*"

Aggression toward dogs and aggression toward cats or other animals:

"Aggression toward dogs" and "aggression toward cats or other animals" are two separate "most important" characteristics. However, any mention of either in the literature refers to them as aggression toward pets or aggression toward animals, so they are discussed together here. Respondents did not specify whether they were referring to aggression toward dogs and animals within the household or aggression toward them in general. Aggression toward animals within the household is a different risk to aggression toward animals outside of the household, but that potential differentiation is outside the scope of the current study. Aggression toward pets or animals was mentioned in four studies (Diesel et al., 2010; Marston et al.,

[15] Although they are not equal, the percentage and proportion are as reported in the study.

2004; Patronek et al., 1996; Salman et al., 1998). Only one study (Patronek et al., 1996) provides statistical evidence of an increased risk for relinquishment associated with these characteristics. Patronek et al. (1996) reported that dogs who were aggressive toward other pets on a daily basis had a 2.91 times (95% CI: 1.57-5.39) increased risk for relinquishment. Diesel et al. (2010) noted that aggression toward pets was reported by surrendering owners for 7.6% of dogs (213/2,806). Salman et al. (1998) reported that aggression toward animals was given as a reason for relinquishment for 7.8% of dogs (178/3,676)[16]. Salman et al. (1998) also noted that surrendering owners reported that 1.1% (21/1,963) of their dogs attacked animals "always", 2.4% (47/1,963) attacked animals "mostly", and 7.6% (150/1,963) attacked animals "sometimes". Marston et al. (2004) reported that of the 3.2% of dogs (~100/3,123) in which aggression was a reason for relinquishment, 20% (20/~100) displayed severe dog aggression. However, it should be noted that in this study, reasons for relinquishment were unknown for approximately one-third of the sample. One organisation reported their concern of putting other animals in the home at risk, "*…we would never put another dog or cat in danger if the dog in our care had aggressive tendencies toward other animals. It is not a successful placement unless all creatures in the house are comfortable and safe.*" Another organisation reported that they are particularly concerned with certain breeds' aggression toward dogs, "*We would have 'stricter' criteria with Strong Breeds [sic], including stricter criteria for dog-dog aggression.*" A third organisation reported that aggression toward dogs was a safety concern, and thus a factor that would lead a dog to be deemed unadoptable, "*If the dog is not good with other dogs and this is not manageable, modifiable or safe.*"

[16] Although they are not equal, the percentage and proportion are as reported in the study.

Biting or snapping (current or history): "Biting or snapping" is mentioned in four studies (Fuh et al., 2014; Marston et al., 2004; New et al., 2000; Salman et al., 1996), but only one study (New et al., 2000) provides statistical evidence of "biting or snapping" being associated with an increased risk for relinquishment. New et al. (2000) compared characteristics of relinquished dogs with those that have remained in households and found that 11.6% (246/2,116) of relinquished dogs had bitten a person, whereas 4.5% (154/3,418) of dogs still in homes had bitten a person. Dogs who had bitten a person were statistically more likely to be relinquished (OR, 2.9; 95% CI: 2.4-3.6). Marston et al. (2004) reported that of the 3.2% (~100/3,123) of dogs for which aggression was a reason for relinquishment, more than half (>50/100) had bitten a human. However, it should be noted that in this study, reasons for relinquishment were unknown for approximately one-third of the sample. Salman et al. (1998) reported that biting was a reason for relinquishment of 3% (138/3,676) of dogs. The study also noted that surrendering owners reported that 11.9% (233/1,958) of their dogs had bitten someone. Fuh et al. (2014) reported that of the 31.9% (73/229) of dogs relinquished for behavioural reasons, 15.1% (11/73) were relinquished due to biting. One organisation reported concerns about the potential risk associated with a dog who bites,

> "*…if we think a dog can still be homed safely, we will do so. e.g. A Yorkshire Terrier who may bite is a lot different to a large/strong breed who may bite. So, too is the situation of when a bite may occur. e.g. A dog who bites with food guarding may still be adoptable Vs [sic] a dog who will bite when petted. Due to the nature of rescue, every effort will be made to find suitable homes for dogs. But if they're deemed to be a danger to the public we will not re-home.*"

Biting as a risk factor to human children's safety as reported in the literature is noted in Chapter 2 (see subsection 2.3.3.2).

3.3.3.2. Other

There is mention in the literature of four of the sub-themes listed in this theme: "destructiveness", "barking behaviour and vocalization", "very high prey drive", and "fearfulness". Of these studies (Diesel et al., 2008; Diesel et al., 2010; Fuh et al., 2014; Marston et al., 2004; Mondelli et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998), three of them (Diesel et al., 2008; New et al., 2000; Patronek et al., 1996) provide statistical evidence of an increased risk for relinquishment associated with any of the characteristics.

Destructiveness: "Destructiveness" was not reported as a "most important" characteristic, and therefore it is not a factor that would lead a dog to be deemed unadoptable. Despite this, it is mentioned in eight studies (Diesel et al., 2008; Diesel et al., 2010; Fuh et al., 2014; Marston et al., 2004; Mondelli et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998), and three of those studies (Diesel et al., 2008; New et al., 2000; Patronek et al., 1996) provide statistical evidence for an increased risk for relinquishment associated with "destructiveness". Diesel et al. (2008) reported that compared with dogs with no owner reported behavioural problems, dogs who were destructive had a 2.1 times (95% CI: 1.3-3.5/3.2) increased risk for being relinquished regardless of whether the owner sought advice. Patronek et al. (1996) reported that dogs who displayed unwanted chewing (a form of destructiveness) were at an increased risk for relinquishment, and the risk increased with the increasing frequency of the behaviour. Dogs who displayed unwanted chewing on a weekly basis had a 2.43 times (95% CI: 1.52-3.88) increased risk for relinquishment, and those who did so on a daily basis had a 5.59

times (95% CI: 3.69-8.47) increased risk for relinquishment. New et al. (2000) also found that dogs who were destructive inside or outside of the house were at a greater risk for relinquishment, and the risk increased with the frequency of behaviour. Dogs who were reported to damage things "most of the time" had 2.2 times (95% CI: 1.7-2.8) increased risk for relinquishment, and those who did so "always/almost always" had a 2.7 times (95% CI: 2.0-3.5) increased risk for relinquishment. Diesel et al. (2010) reported that destructiveness as a sole problematic behaviour was a characteristic provided by surrendering owners for 7.0% (196/2,806) of dogs, and in conjunction with other problematic behaviours for 11.4% (321/2,806) of dogs. Mondelli et al. (2004) reported that destructiveness was a reason for relinquishment for 7.1% (22/307) of dogs. Salman et al. (1998) reported that outside destructiveness and inside destructiveness were reasons for relinquishment for 3% (124/3,676) and 2% (108/3,676) of dogs, respectively. Salman et al. (1998) also noted that surrendering owners reported that 7.3% (144/1,973) of their dogs caused damage to house "always", 7.5% (147/1,973) caused damage to house "mostly", and 21.8% (431/1,973) caused damage to house "sometimes". Marston et al. (2004) reported that behavioural reasons collectively accounted for 10.82% (338/3,123) of the dogs that were relinquished, and of that subset destructiveness was given as a reason for 7.40% (25/338). Fuh et al. (2014) reported that of the 31.9% (73/229) of dogs relinquished for behavioural reasons, 13.7% (10/73) were relinquished for destroying furniture, which infers destructiveness.

Barking behaviour and vocalization: "Barking behaviour and vocalization" was a "most important" characteristic. Unwanted barking behaviour and vocalization are mentioned in five studies (Diesel et al., 2010; Fuh et al., 2014; Marston et al., 2004; Mondelli et al., 2004; Salman et al., 1998), but none of the studies provide any

statistical evidence of an increased risk for relinquishment associated with this characteristic. Fuh et al. (2014) reported that of the 31.9% (73/229) of dogs relinquished for behavioural reasons, 72.6% (53/73) were relinquished for barking, which was the most common behavioural reason. Diesel et al. (2010) reported that unwanted barking was a characteristic of 5.2% (146/2,806) of relinquished dogs. Mondelli et al. (2004) noted that vocalizing too much was a reason for relinquishment of 2.3% (7/307) of dogs. Salman et al. (1998) noted that being too vocal was a reason for relinquishment for 2% (85/3,676) of dogs. Salman et al. (1998) also noted that surrendering owners reported that 5.0% (99/1,972) of their dogs were too noisy "always", 9.1% (179/1,972) were too noisy "mostly", and 20.1% (575/1,972) were too noisy "sometimes". Marston et al. (2004) reported that of the 10.82% (338/3,123) of dogs that were relinquished for behavioural reasons, 10.36% (35/338) of that subset were relinquished due to barking behaviour.

Very high prey drive: "Very high prey drive" is a factor that would lead a dog to be deemed unadoptable. It is mentioned in two studies (Marston et al., 2004; Salman et al., 1996), but neither study provided any statistical evidence for it being associated with an increased risk for relinquishment. Marston et al. (2004) reported that of the 10.82% (338/3,123) of dogs relinquished for behavioural reasons, 8.58% (29/338) of that subset were relinquished for predatory behaviour. Salman et al. (1996) noted that "chases animals" was a reason for relinquishment for <1% (16/3,676) of dogs. Thus, although uncommon, it may be an important consideration when it does occur.

Fearfulness: "Fearfulness" was not reported as a "most important" characteristic, and therefore it is not a factor that would lead a dog to be deemed unadoptable. However, any fear-based response that is associated with aggression falls outside of

this theme (see above). Fearfulness is mentioned in two studies (New et al., 2000; Salman et al., 1998) in relation to relinquishment, though only one study (New et al., 2000) provides statistical evidence that this characteristic is associated with an increased risk for relinquishment. New et al. (2000) reported that surrendering owners who reported that their dog showed fearfulness had a significantly increased risk for relinquishment. Those who were reported to show fearfulness "most of the time" had 1.9 times the odds (95% CI: 1.5-2.5) of being relinquished. Dogs who were reported to show fearfulness "always/most always" had 2.8 times the odds (95% CI: 2.0-4.0) of being relinquished. Salman et al. (1998) noted that being the dog being afraid was a reason for relinquishment for <1% (21/3,676) of dogs. The study also noted that surrendering owners reported that 4.7% (92/1,966) of their dogs acted fearful "always", 6.2% (121/1,966) acted fearful "mostly", and 20.1% (395/1,966) acted fearful "sometimes".

3.3.3.3. Behaviour in or reaction to specific situations or environments

There is mention in the literature of three sub-themes within this theme: "behaviour when left alone or separation anxiety", "behaviour indoors", and "behaviour outdoors or in garden". Neither of the two relevant studies (Marston et al., 2004; Salman et al., 1998) provide statistical evidence for an increased risk for relinquishment associated with these sub-themes. Only "behaviour outdoors or in the garden" was a "most important" characteristic, but it is not a factor that would lead a dog to be deemed unadoptable. It should be noted that if behaviours in the three sub-themes that comprise this theme are associated with aggression then it falls outside of this theme (see above).

Behaviour when left alone or separation anxiety: Only one study (Marston et al., 2004) mentions "behaviour when left alone or separation anxiety", and it only

mentions it descriptively. Marston et al. (2004) noted that of the 10.32% (338/3,123) of dogs were relinquished for behavioural reasons, separation issues accounted for 2.96% (10/338) of that subset.

Behaviour indoors and behaviour outdoors or in garden: "Behaviour indoors" and "behaviour outdoors or in garden" are two separate sub-themes, and the latter is considered a "most important" characteristic. However, because respondents did not clarify what specific types of behaviours they were concerned with or looking to assess, there was no direct mention of them in the literature. Having said that, one behaviour ("escaping") that respondents may have been referring to with these sub-themes is mentioned in two studies (Marston et al., 2004; Salman et al., 1998), but neither provide statistical evidence of an increased risk for relinquishment associated with the behaviour. Because neither study specified the nature of the escaping behaviour (e.g. digging under a garden fence, running out the front door), these two sub-themes were grouped together as escaping could apply to both behaviour indoors and behaviour outdoors or in a garden. Salman et al. (1998) reported that escaping behaviours were the reason for relinquishment for 3% (125/3,676) of dogs. Salman et al. (1998) also noted that surrendering owners reported that 3.6% (71/1,953) of their dogs escaped "always", 4.5% (88/1,953) escaped "mostly", and 13.3% (259/1,953) escaped "sometimes". Marston et al. (2004) reported that of the 10.32% (338/3,123) of dogs relinquished for behavioural reasons, escaping behaviour accounted for 24.62% (84/338) of that subset, which was the most common behavioural reason.

3.3.3.4. Behaviour in situations involving touching or handling

There is no specific mention in the literature or reference to any of the five sub-themes that comprise this theme: "when physically restrained", "when touching

collar or putting on lead or harness", "when touching other specific body parts or types of handling (e.g. tail pull, hugging, being picked up)", "when being groomed", and "when being examined by a veterinarian". None of these sub-themes were reported as being a "most important" characteristic, and therefore none are factors that would lead to a dog being deemed unadoptable, however, if the response is associated with aggression then it falls outside of this theme (see above).

3.3.3.5. Future home needs

There is mention in the literature of only one of the sub-themes here: "activity level or exercise needs", which was a "most important" characteristic. It is mentioned in four studies (Marston et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998), and two of them (New et al., 2000; Patronek et al., 1996) provide statistical evidence of an increased risk of relinquishment associated with the characteristic. Patronek et al. (1996) reported that dogs who displayed hyperactivity on a daily basis had a 2.64 times (95% CI: 1.94-3.60) increased risk for relinquishment. New et al. (2000) also reported that dogs who were reported by surrendering owners as being overly active/hyper "most of the time" had a 1.7 times (95% CI: 1.5-2.1) increased risk of relinquishment, and those who were reported as being overly active/hyper "always/almost always" had a 3.2 times (95% CI: 2.6-3.9) increased risk of relinquishment. Marston et al. (2004) reported that of the 10.32% (338/3,123) of dogs relinquished for behavioural reasons, hyperactivity accounted for 20.41% (69/338) of that subset, and it was the second most common behavioural reason for relinquishment. Salman et al. (1998) noted that being too active was a reason for relinquishment for 2% (80/3,676) of dogs. The study also noted that surrendering owners reported that 14.7% (289/1,971) of their dogs were hyperactive

"always", 15.5% (306/1,971) were hyperactive "mostly", and 24.0% (473/1,971) were hyperactive "sometimes".

3.3.3.6. Behaviour around people

There is a potential reference in one study (Scarlett et al., 1999) to one sub-theme within this, "behaviour around children", but that study does not provide any statistical evidence for an increased risk for relinquishment associated with it, outside of aggressive behaviour. "Behaviour around children" is a factor that would lead a dog to be deemed unadoptable. Scarlett et al. (1999) reported that "conflict with children" was a reason for relinquishment for 3.1% (64/2,045) of dogs. However, the study did not clarify the nature of the conflict with children, so the specific role of dogs' behaviour in the conflict is unknown.

3.3.3.7. Behaviour around dogs

There is no mention in the literature of any of the sub-themes related to this theme although there is potential reference to the theme itself in one study (Mondelli et al., 2004), but it does not provide any statistical evidence of an increased risk for relinquishment associated with it. Mondelli et al. (2004) reported that "problems with other pets" was a reason for relinquishment for 9.4% (29/307) of dogs. The study did not specify the species of other pet(s), and it also did not clarify what role the surrendered dogs' behaviour had in the problems with other pets. Any behaviour around dogs that is associated with aggression is outside of this theme (see above).

3.3.3.8. Knowledge of basic commands and/or general training

There is mention in the literature of two sub-themes in this theme: being "housetrained" and "walking on lead behaviour", which are mentioned in six studies (Diesel et al., 2010; Fuh et al., 2014; Marston et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998). Two of the studies (New et al., 2000;

Patronek et al., 1996) report only on the risk for relinquishment associated with housetraining.

Housetrained: "Housetrained" was not a "most important" characteristic, and therefore it is not a factor that would lead a dog to be deemed unadoptable. However, there is mention of or reference to housetraining in six studies (Diesel et al., 2010; Marston et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998), and two of the studies (New et al., 2000; Patronek et al., 1996) provide statistical evidence of an associated increased risk for relinquishment associated with issues relating to housetraining. Patronek et al. (1996) reported that dogs who had inappropriate elimination were at increased risk for relinquishment, and the risk increased with the increasing frequency of the behaviour. Those who were reported to have had inappropriate elimination ≤2 times per month had a 1.46 times (95% CI: 1.01-2.11) increased risk for relinquishment. The risk increased to 3.36 times (95% CI: 2.09-5.38) for those who had inappropriate elimination weekly, and it increased further to 8.52 times (95% CI: 5.23-13.87) for those who had inappropriate elimination on a daily basis. Similarly, New et al. (2000) reported that dogs who soiled inside the house were at an increased risk for relinquishment, and the risk increased with the increasing frequency of the behaviour. Dogs who were reported by their surrendering owners to have soiled inside the house "some of the time" had a 1.2 times (95% CI: 1.1-1.4) increased risk for relinquishment. Those who soiled inside the house "most of the time" had a 2.7 times (95% CI: 2.1-3.7) increased risk for relinquishment, and those who soiled inside the house "always/almost always" had a 3.7 times (95% CI: 2.7-4.9) increased risk. Diesel et al. (2010) noted that urinating or defecating in the house was a characteristic of 3.9% (109/2,806) of dogs relinquished. Salman et al. (1998) noted that house soiling was a reason for

relinquishment for 3% (124/3,676) of dogs. Salman et al. (1998) also noted that surrendering owners reported that 7.5% (147/1,971) of their dogs "always" soiled in the house, 6.3% (125/1,971) soiled in the house "mostly", and 18.5% (364/1,971) soiled in the house "sometimes". Fuh et al. (2014) reported that of the 31.9% (73/229) of dogs relinquished for behavioural reasons, 6.8% (5/73) were relinquished for careless urination, which infers housetraining issues. Marston et al. (2004) reported that of the 10.32% (338/3,123) of dogs relinquished for behavioural reasons, not being housetrained accounted for 2.96% (10/338) of that subset.

Walking on lead behaviour: "Walking on lead behaviour" was a "most important" characteristic, but it is only mentioned in one study (Marston et al., 2004), and it does not provide any statistical evidence for an increased risk for relinquishment associated with it. Marston et al. (2004) reported that of the 10.32% (338/3,123) of dogs relinquished for behavioural reasons, "not walking well" accounted for 1.48% (5/338) of that subset.

3.3.3.9. Behaviour around other animals

There is reference in the literature to only one sub-theme, "behaviour around cats and/or other small animals off and/or on lead", which was a "most important" characteristic. The only reference to it (Mondelli et al., 2004) does not provide any statistical evidence of a change in risk of relinquishment. Mondelli et al. (2004) reported that "problems with other pets" was a reason for relinquishment for 9.4% (29/307) of dogs, but the study did not clarify what the species of pet(s) were. It should be noted that any behaviour around other animals that could be associated with aggression is outside of this theme (see above).

3.3.4. What is the quality of the practical application of a dog screening assessment?

Fifty-eight (81.7%) of the 71 respondents conduct dog assessments for all dogs pre-adoption; of those in the US, 18/27 (66.7%) do, and of those in the UK, 40/44 (90.9%) do. Of those in the UK that do, 18/40 (45.0%) were multi-branch organisations, and 22/40 (55.0%) were single-site organisations. 3/71 respondents (4.2%) do not assess all dogs; of those in the US, 2/27 (7.4%) do not, and of those in the UK, 1/44 (2.3%) do not. The one organisation in the UK that does not is a single-site organisation that is not breed-focused. This information was unknown or it was not possible to draw a conclusion based on their responses for 10/71 respondents (14.1%); of those in the US, it was unknown/indeterminable for 7/27 (25.9%), and of those in the UK, it was unknown/indeterminable for 3/44 (6.8%). The reasons provided by the three respondents for not assessing all dogs were:

- "*As far as formal assessments go, they are not necessary for the majority of the dogs we take in because we are foster based and get to know the dogs so well in our homes, but our trainer will give us a full assessment (which we pay for) so we know how best to work with any issues we may observe. So far we have used our trainer to formally assess and work with two of our dogs, both pitbulls.*"
- "*Manpower, finance and weighing up the actual need to temp test every dog.*"
- "*We rely on trusted shelter staff occasionally*."

Based on the first two responses, the two most common reasons for not assessing all dogs appear to be a lack of resources and the belief that assessments only need to be done on an "as needed" basis or for breeds that could have a behaviourally problematic reputation (e.g. pit bulls). The third response is more ambiguous and

less straightforward to interpret. The respondent may have been implying that they have a limited number of shelter staff who are sufficiently trained to conduct assessments, which would then mean that a lack of resources is the issue.

As previously noted (see subsection 2.2.3.1), 64.8% (46/71) of respondents reported that they highly value or give more weight to certain factors or characteristics in dog assessments. For the 15.5% (11/71) of respondents who reported that they do not highly value certain factors or criteria, they provided responses as to how they instead score or rate assessments. Sample responses included:

- "*No everything is taken into consideration.*"
- "*No - more would depend on the potential home and to how suitable they were for the particular dog.*"
- "*No - it is all just as important to ensure the dog is happy, given the correct support and finds the right home. All info is needed to get a full picture*."

These responses suggest that one reason why respondents address so many additional factors in assessments, even if they are not highly valued, is because they are aiming to acquire as much information as possible in general, such as how a dog behaves in various situations and environments, with the hope that this information will allow them to more accurately match the dog to an appropriate adopter. Additional evidence for this reasoning could be found in responses from the respondents that do more highly value certain factors. One respondent that reported that aggression toward humans is more highly valued, also stated in regard to the rest of factors included in assessments:

"*Other areas are designed more for information purposes / matching dogs up with suitable owners*."

Another respondent that reported a dog's behaviour around humans is more highly valued, also stated that:

"*The assessment acts as an overall guide to build a picture, often elements link.*"

Collectively all of the responses suggest, regardless of whether a respondent does or does not more highly value certain factors or criteria, an emphasis on a "whole picture approach" to assessments, which again focuses on gaining as much information as possible about a dog from assessments.

3.4. Discussion

The vast majority of respondents (71/73) assess all of their dogs pre-adoption, and based on the responses provided, the key reasons respondents may not assess all of their dogs is due to a lack of resources and the belief that not all dogs need to be assessed (e.g. due to their breed). As with sample recruitment in Chapter 2, there may have been a bias in this process due recruitment means. Organisations in the UK were all members of the ADCH, so again, these may represent the upper crust of rehoming organisations. Similarly, in the US, organisations were all Petfinder members, for which specific criteria must be met to gain membership. These potential recruitment biases may have affected the results of this study, such as in the very high proportion of respondents that screen all of their dogs pre-adoption.

The majority of respondents (46/71) also reported that they more highly value certain factors over others. Responses provided by respondents that both do and do not do this provided two reasons for including the remaining factors in

assessments: for informational purposes to better match a dog to an adopter and/or to gain as much information as possible to get an overall picture of the dog. It is not necessarily surprising that they collect such information as potential adopters often like to know as much about the dog as possible. However, in striving to do so, they may be unnecessarily putting a strain on their resources, and reporting information that is erroneous or not evidence-based.

Table 3.4

Dog assessment themes and sub-themes that are reported in the literature as reasons for relinquishment or characteristics of dogs as reported by surrendering owners

Reason/characteristic	Total number of studies mentioned in	Risk factor[1]	Number of studies with reported evidence[2,3]	"Most important" factor[4]	Factor that would lead a dog to be deemed unadoptable[4]
Destructiveness*	7	√	3		
Housetrained*	5	√	2		
Activity level or exercise needs*	4	√	2	√	
Aggression toward people*	4	√	2	√	√
Aggression toward cats or other animals*	4	√	1	√	√
Aggression toward dogs*	4	√	1	√	√
Biting or snapping*	3	√	1	√	√
Fearfulness*	2	√	1		
Barking behaviour and vocalization	4			√	
Aggression	2			√	√
Behaviour indoors	2				
Behaviour outdoors or in garden	2			√	
Very high prey drive	2			√	√
Behaviour around cats and/or other small animals off and/or on lead	1			√	
Behaviour around dogs[5]	1				
Behaviour around children	1			√	√
Behaviour when left alone or separation anxiety	1				
Walking on lead behaviour	1			√	

*Denotes risk factors (i.e. reasons for which there is statistically significant evidence)
[1] Reasons for which there is statistically significant evidence that such factors are associated with an increased risk of relinquishment
[2] For an increased risk of relinquishment associated with each reason/characteristic
[3] See Table 2.1 for the complete list of studies
[4] As reported by respondents in this current study
[5] Mention in the literature was to the theme itself, not of any of the "most important" characteristics within the theme

Evidence was found in the literature pertaining to risk factors for relinquishment to support including eight assessed characteristics or factors in dog assessments: "destructiveness", "housetrained", "activity level or exercise needs",

"aggression toward people", "aggression toward cats or other animals", "aggression toward dogs", "biting or snapping (current or history)", and "fearfulness". Although all eight factors have a statistically significant increased risk of relinquishment associated with them, only four of them are factors that would lead a dog to be deemed unadoptable: "aggression toward people", "aggression toward cats or other animals", "aggression toward dogs", and "biting or snapping" (see Table 3.4). Furthermore, of the four remaining factors, three of them were not even reported as "most important characteristics": "destructiveness", "housetrained", and "fearfulness". It is perhaps surprising then that all three are mentioned in multiple studies, and moreover the risk of relinquishment for the three characteristics appears to increase with the frequency of these behaviours (Diesel et al., 2008; Diesel et al., 2010; Marston et al., 2004; Mondelli et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998). It is possible that housetraining issues were more frequently reported for dogs at ages when housetraining issues might be more likely to occur (e.g. puppies). It also might be that dogs who were left home for extended periods of time had more issues with housetraining. It would be useful for future research to investigate possible statistical relationships between such factors and housetraining issues. "Activity level or exercise needs" is mentioned in multiple studies (Marston et al., 2004; New et al., 2000; Patronek et al., 1996; Salman et al., 1998) and two of them (New et al., 2000; Patronek et al., 1996) provide evidence for an increased risk for relinquishment associated with this issue. It may be that surrendering owners are over-reporting hyperactivity as they might believe it to be more socially acceptable than anything related to aggression. This deserves further investigation.

The theme of *aggression* contains the majority (23/42) of the "most important" characteristics, all of which are also factors that would lead a dog to be deemed unadoptable. It is clear that screening for aggression, or what might be characterised as aggressive behaviours, is a central focus in organisations' dog assessments; however, the predictive value of such tests is unknown, and even for published tests it is often poor (Brady, Cracknell, Zulch, & Mills, 2018). As previously noted, there is evidence (Diesel et al., 2008; New et al., 2000; Patronek et al., 1996) of an increased risk for relinquishment associated with four of the characteristics in this theme: "aggression toward people", "aggression toward dogs", "aggression toward cats or another animals", and "biting or snapping (current or history)". However, an increased risk of relinquishment associated with aggression is not the only concern. Clearly there are also other issues around aggressive behaviour such as the liability associated with rehoming a dog that then bites someone. As was reported by respondents, there are risks associated with rehoming a dog that is believed to be unsafe. Evaluating aggression as a broad concept is outside the scope of this current study. However, what appears to be unique about the theme of *aggression* and all of its sub-themes, is that the implications of its presence are not only the potential risk for relinquishment, but also the risk and liability associated with it. It is important that organisations invest in establishing the quality of their assessments as otherwise they may not only be providing false assurances but also wasting valuable resources.

In addition to the eight factors for which there is evidence in the literature, a further ten are at least mentioned in the literature (see Table 3.4). Of those, three were factors that would lead a dog to be deemed unadoptable: "aggression", "very high prey drive", and "behaviour around children", and four were "most important"

characteristics (aside from those that would make a dog unadoptable): "barking behaviour and vocalization", "behaviour outdoors or in garden", "behaviour around cats and/or other small animals off and/or on lead", and "walking on lead behaviour". Although there is evidence for four sub-themes of *aggression* (see above), there is none for the broad theme itself. It is possible that no studies have investigated whether "very high prey drive" is a risk factor for relinquishment because it is often associated with specific breeds (e.g. greyhounds). Without engaging breed specific rehoming organisations in relevant research, the scientific data will be limited in its scope and relevance to the full constituency of those involved in shelter and rehoming work. It may be that respondents meant the same thing by "chase proneness" and "behaviour around cats and/or other small animals off and/or on lead", but they reported it differently. It is also possible that the lack of evidence for "behaviour around children" and "behaviour around cats and/or other small animals off and/or on lead" may be due to the vague way they were expressed. It seems reasonable to suggest that what they were actually implying was screening for aggressive tendencies around children, cats, and small animals, all of which there is evidence of increased risks for relinquishment (see above). This could be clarified in future research by gathering data in a forced-choice manner based on the data generated here rather than the open-ended manner required in a pioneering study such as this.

It should be emphasised that there is always the potential concern with owner reporting of reasons for relinquishment or behavioural histories due to limited research into the quality of them, as is discussed in Chapter 2. It is possible that surrendering owners are under-reporting issues that are less socially acceptable (e.g. aggression), instead expressing them in other ways (e.g. overactive) and/or over-

reporting behaviour issues that might not be as problematic to rehome the dog (e.g. housetraining). As mentioned in Chapter 2, the quality of owner reports has not yet been widely evaluated, so there is limited evidence for their reliability. However, several studies have evaluated the reliability and validity of dog assessments, and often with a focus on screening for aggression (e.g. Christensen et al., 2007; Mornement et al., 2010; Taylor & Mills, 2006). Based on the reports of such studies, the usefulness of the vast majority of dog assessments is debatable, so perhaps there should be a shift in organisations' focus and resources away from dog assessments, the outcomes of which can often have grave consequences for dogs. This argument has been put forth by Patronek and Bradley (2016) and Patronek, Bradley, and Arps (2019), who have recently suggested a shift away from the usage of dog assessments in shelters due to assessments' lack of predictive value (i.e. assessments are unable to predict problematic behaviour in a home). Alternatively, it might be much more beneficial for organisations to instead focus resources on supporting adopters post-adoption.

The organisations comprising the sample used in this study were located in the UK or the US. Although a total of nearly 500 organisations were contacted, responses were received from only 14.7% (73/496), nearly two-thirds of which were in the UK, so it is possible that this sample size was not truly representative of rehoming organisations in either country. In the US, an exact number of shelters or rehoming organisations in the entire country is unknown as there is no central reporting agency. However, *Shelter Animals Count*™ (www.shelteranimalscount.org), a national initiative aiming to collect statistics and data on animals sheltered throughout the country, has collected data from over 5,000 shelters and rehoming organisations in the US. Considering that data was collected

from only 28 organisations in the US in the current study, this further suggests these organisations did not provide representation of the entire country. In the UK, the Association of Dogs and Cats Homes has 273 members (rehoming organisations and their respective branches)[17] (www.adch.org.uk). Although this number does not account for all rehoming organisations in the UK, based on this figure, it does suggest that the 45 organisations from which data was collected in the current study may be more representative of organisations in the UK than was true for the proportion in the US. Aside from the number of organisations in each country, another aspect to consider when determining how representative the sample in the current study was is how many dogs reside within each organisation. For example, a smaller organisation, may only have 20 dogs in their care at any given point, whereas a larger organisation, such a municipal shelter in an urban area, may have hundreds of dogs in their care, and thus the dog screening policies of the latter would affect a far greater number of dogs than in the former, but still each organisation is counted as one. Such information was not collected for the current study in order to evaluate the sample's representativeness in comparison to the number of dogs entering shelters annually, but it would be useful for future research to gather this data.

A third aspect of representativeness to consider is that while the organisations in the UK were from various regions of the country, those in the US were located in a specific geographical area (i.e. Southern California). As such, it is possible that these organisations are not representative of the entire US, and this may have affected the types of information sought in dog assessments. In a comparison of two US cities, Weiss et al. (2014b) reported differences in factors

[17] As of when data for this study was collected

leading to dog selection and dog relinquishment based on location (e.g. a higher proportion of respondents in New York City reported people-related issues contributing to their decision to relinquish a dog than did respondents in Washington DC, but a higher proportion of respondents there reported dog behaviour issues contributing to their decision than in New York City). As such, it may be that organisations in different geographical locations take into account common reasons for relinquishment provided by surrendering owners in their local area when deciding what their foci in dog assessments should be. As the US in particular is a very large and diverse country, it would be useful for future research to compare various aspects of the rehoming process based on geographical location. It is also noteworthy that none of the organisations in the US had multiple branches, as did several in the UK. It is possible that this difference is again due to geographical location, but it also may be that this simply is a difference between the nature of rehoming organisations in the two countries. Future research could investigate this by sampling organisations from diverse geographical areas of the US.

This study illustrates both the breadth and the specificity of characteristics addressed in rehoming respondents' dog assessments, and thus the scope of the information respondents aim to gather from these assessments. Screening for potential behavioural issues is clearly central to assessments, and they are frequently reported reasons for relinquishment (see Table 2.7). However, there is statistically significant evidence of an increased risk for relinquishment associated with only eight of these behaviours (see Table 3.4). Such evidence offers justification for including screening for some behaviours in assessments, and it highlights the gravity of the role behavioural issues can have in the breakdown of the dog-owner relationship. However, it is worth noting that there is very limited evidence

concerning the predictive validity of any in-house behavioural tests (e.g. Mornement et al., 2010; Poulsen et al., 2010), and while such information may be provided by owners surrendering their dog, it is likely that they do not provide a full and complete behavioural record of their pet. It is striking that the number of factors that would lead a dog to be deemed unadoptable is more than three times the number of factors with reported evidence of an increased risk of relinquishment. Moreover, only four of the factors that would cause a dog to be deemed unadoptable ("aggression toward people", "aggression toward cats or other animals", "aggression toward dogs", and "biting or snapping [current or history]") are reported risk factors for relinquishment. The remaining 24/28 of the factors could cause a dog to be labelled unnecessarily as unadoptable, and depending on the organisation, this could have profound consequences for the dog.

No evidence in the scientific literature could be found to justify the inclusion of factors on the basis of ensuring a good qualify of life for a dog or overall good welfare. Marinelli et al. (2007) did investigate the relationship between some dog characteristics and a series of (theoretical) metrics of quality of life, and this study was reviewed as part of this research (see section 3.2 and subsection 3.3.3). However, none of the characteristics evaluated in the study were those addressed in organisations' dog screening assessments. Therefore, while it may be that organisations' motivation behind aiming to gather particular information in dog screening assessments is to ensure a good quality of life for the dog, because they have not yet been evaluated in the scientific literature, it is not possible to conclude that such information is predictive of a dog's quality of life in their new home. However, as was discussed in Chapter 2, assessing and predicting a dog's quality of life is very challenging. The fact that there is currently such limited research on it

may well be because it is so difficult to do so objectively. An initial step that future research could take in this direction would be to build a consensus on what qualifies as a successful placement and what it looks like in practice. From there, the potential ways in which to objectively measure success, and ultimately quality of life, could be explored in order to ensure dogs are treated consistently.

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This chapter along with Chapter 2 have highlighted the breadth and scope of information about dogs and adopters that organisations aim to gather from pre-adoption assessments of both. There is evidence in the literature of which dog and owner factors are associated with an increased risk for relinquishment (Diesel et al., 2008, New et al., 2000; Patronek et al., 1996). However, far more factors are included in assessments than for which there is scientific evidence. Having said that, it needs to be acknowledged that information is also gathered about dogs and adopters to aid in the matching process. By gathering as much information about both parties as possible, organisations may feel that they can best match dogs to adopters, which was also noted by Mornement et al. (2010). While some organisations have standardised the way in which they conduct the matching process (e.g. ASPCA, 2010, 2012), there is still a lack of published (and thus independently verifiable) scientific evidence to support the validity of such practices. Moreover, while some studies have investigated the predictive validity of behavioural assessments used pre-adoption (e.g. Marder et al., 2013), there is a lack of research that has specifically investigated whether there is a relationship between pre-adoption behavioural assessments and rehoming success, i.e. whether conducting such assessments affects whether or not a dog placement will be successful. These

are both areas that would be useful foci for future research, the findings of which would contribute to improving the efficiency of the rehoming process.

Aside from the evidence of risk factors for relinquishment and factors associated with a risk to human safety that are characteristics of the dog or the owner, there is substantial evidence for concern over the importance of what happens after the dog is adopted. Several studies have found that aspects of post-adoption care and support significantly affect the risk for relinquishment. Patronek et al. (1996) reported that lack of veterinary care was strongly statistically associated with an increased risk for relinquishment, and the risk increased with lower frequencies of veterinary visits. Compared with households that visited the veterinarian ≥2 times per year, dogs in those households who visited one time per year were at a 2.47 times (95% CI: 1.47-4.16) increased risk. Dogs in households who visited <1 time per year or never were at a 5.88 times (95% CI: 2.78-12.44) or a 38.43 times (95% CI: 17.62-83.83) increased risk, respectively, for relinquishment. After adjusting for household income, dog sterilization status, and duration of ownership, the association decreased slightly for visits <1 time per year and never visits, but it was still strong (OR, 2.91, 4.41, and 22.90, respectively). The risk of relinquishment was lower for all ages of dog who received more frequent veterinary care. Furthermore, the study reported that dogs who visited a veterinarian at least once per year tended to have a lower frequency of behavioural issues than dogs who visited the veterinarian less than once per year. In addition, Diesel et al. (2008) reported that dogs in households who attended post-adoption training classes were at a significantly decreased risk for relinquishment (OR, 0.3; 95% CI: 0.2-0.4). Similarly, Patronek et al. (1996) reported that dogs in households who did not attend training classes were at significantly increased risk for relinquishment (OR, 5.09;

95% CI: 2.71-9.59). As Diesel et al. (2008) suggested, while behavioural issues are a frequent reason for return, and some of these result in an increased risk for relinquishment, it is possible that the underlying cause of some is medical, not psychological (e.g. inappropriate elimination), so regular veterinary care is important to help to address such issues. Even if the behavioural issues do not have an underlying medical cause, many owners defer to their veterinarian for all sorts of dog-related concerns, so the veterinarian may also be key to pointing them in the direction of appropriate support (e.g. training classes) to address any behavioural issues.

It is inevitable that unfavourable behaviours (or medical issues) will arise at some point over the course of the dog-owner relationship regardless of what conclusions are drawn from any pre-adoption screening assessment, so based on the significant change in risk associated with post-adoption care, it would seem a far better use of organisations' resources to focus on ensuring adopters have sufficient post-adoption support. While there is evidence to support the importance of post-adoption care, it is possible that these factors (such as routine veterinary care and attending training classes) are proxies for other things, such as an owner's awareness of a dog's needs, and their willingness to expend resources (e.g. time and money) to meet those needs. An owner's willingness to meet those needs points to an appreciation by an owner of the need to be flexible within a relationship for it to work (e.g. Doelling & Johnson, 1990; Green et al., 1996); it may actually be this that underpins many of the risks for relinquishment, including managing and/or accepting behaviour problems. However, it may not be just the owner's level of flexibility that may be of importance; the dog's ability to adapt and adjust to their home environment may also crucial. Indeed in the literature on placing human

foster children into foster homes, flexibility in the carer-dependent relationship has been identified as an important characteristic to the success of the placement (e.g. Doelling & Johnson, 1990; Green et al., 1996), and this is investigated further in the following chapters.

Chapter 4

A very limited amount of research has focused on shelters' adopter screening practices, as well as the fundamental characteristics of adopters that may be affecting the outcome of dog placements, such as the role of behavioural flexibility. Research has investigated the role of behavioural flexibility in human foster child-foster parent relationships; there are notable parallels between that relationship and the dog-owner relationship, so investigating behavioural flexibility in dog adopters may be worthwhile. For this purpose, measures were adapted from their original purpose of placing human foster children into homes to be relevant to the dog-owner relationship. Once adapted, the measures were administered to three human samples: long-term dog owners, dog relinquishers, and dog adopters, in order to assess: the reliability of the measures, whether long-term dog owners are more behaviourally flexible than dog owners, the long-term stability of the measures, and if the measures have adequate predictive validity to predict which dog placements have long-term success. The original factor structure of one of the measures (the unadapted DOTS-R) was unable to be replicated, which was evidence that the measure was unreliable. Further analyses on two subscales of the measure revealed that none of the items were able to distinguish between long-term dog owners and dog relinquishers, so it was concluded that the entire measure was not useful for the aims of this research. A series of factor analyses performed on the other measure (the adapted DOTS-R Child Expectations) revealed that there were 13 reliable items in it. Further analyses revealed that six of those were able to distinguish between the same two populations. The six-item model was renamed the Canine Adopter Expectations Survey. There were significant differences between the mean summed

CAES scores of the long-term dog owner and the dog relinquisher samples, which suggests that long-term dog owners have greater flexibility in their expectations of some areas of dog behaviour, namely in a dog's ability to adapt. Using concordance correlations to analyse the subset of the long-term dog owner sample that retook the CAES twice, the measure was determined to have good long-term stability (i.e. $p < .05$). In order to assess whether the CAES has adequate predictive validity, the subset of the dog adopter sample that completed the initial survey, the retest, and the Dog Owner Satisfaction Survey approximately six months post-adoption was used. A successful placement was qualified by owners' level of satisfaction with their relationship with their dog. The long-term stability of that survey was assessed in the same manner as the CAES; the survey had good long-term stability (i.e. $p < .05$). A two-tailed Spearman correlation was performed with the initial CAES scores of the subset of the dog adopter sample and their satisfaction survey scores; the correlation was not significant, which indicates that CAES scores were not suggestive of an owner's level of satisfaction with their relationship with their dog, so the CAES may not have good predictive validity of success of relationship as qualified by this means.

4.1. Introduction

As discussed in previous chapters, there is a growing research focus on various aspects of dog rehoming. As discussed in Chapter 1, in order to improve the prospects of a successful placement, rehoming organisations often gather information about the potential adopter during the rehoming process, with the hopes that such information will allow them to find a good match between adopter and dog (ASPCA, 2010, 2012; Weiss et al., 2014a). There can be variation in the degree of formality organisations employ in this process. A very limited amount of academic

research has evaluated these commonly used methods of adopter screening. Weiss et al. (2014a) did investigate whether there were any differences in dog care post-adoption between those adopted with a more formal, policy-based approach, and those adopted with more casual, conversation-based approach. Additionally, the results of the qualitative study that comprised Chapter 2 illustrated the types and breadth of information rehoming organisations seek to gather from their potential adopter screening assessments. Not only is there a lack of research focusing on rehoming organisations' adopter screening methods, there is also a lack of research on fundamental qualities of adopters in general, which may be affecting the outcome of a dog placement. While several of the studies on risk factors for relinquishment have considered both dog and human (owner) factors (Diesel et al., 2008; Dolan et al., 2005; Kwan & Bain, 2013; New et al., Patronek et al., 1996; Salman et al., 1998), there is a gap in the literature investigating potential differences between people who have relinquished a dog and people who have kept a dog long-term, which may be key to understanding why some dog placements are successful while others lead to relinquishment. Moreover, the role that behavioural flexibility might play in the rehoming process has not yet been considered, even though studies have investigated its role in human foster child-foster parent relationship (Doelling & Johnson, 1990; Green et al., 1996; Street & Davies, 1999). As discussed in Chapter 1, there are parallels that can be drawn between the two relationships, so since these studies have reported the importance of flexibility in human foster parents, investigating it in dog owners could be equally as useful. As such, insight into these potential differences in terms of aspects of behavioural flexibility could be applied to improve the efficiency of the adopter screening process and increase successful dog placements. Therefore, the aim of this chapter is to determine if owners who

have not relinquished a dog show evidence of greater behavioural flexibility than those who have relinquished a dog. In order to meet this aim, there are five objectives:

1. to use expert panels to assess the face validity, the feasibility of administration, and the comprehensibility of the adapted measures (originally used to place human foster children into foster families),
2. to assess the reliability of the measures,
3. to assess whether long-term dog owners are statistically significantly more behaviourally flexible than dog relinquishers,
4. to assess the long-term stability of the measures, and
5. to assess whether the adapted measures have adequate predictive validity in order to predict which dog placements have long-term success.

The first objective pertains to the adaptation of the measures from their original purpose (i.e. placing human children into foster families) to be relevant to the dog-owner relationship. Expert panels were employed for the three components of this objective; the experts that comprised each panel were appropriate for each component (e.g. dog behaviour scientists to assess the face validity of the measures' items). "Face validity" is defined as, "*validity assessed by having 'experts' review the contents of a test to see if they seem appropriate 'on their face'*" (Reber & Reber, 2001). This type of validity is often used in test development in a wide range of fields. It has been used in the medical field in the development of a surgical simulator (Bright, Vine, Wilson, Masters, & McGrath, 2012). It has been used in the field of psychology in the development of myriad psychometric scales and questionnaires, such as for a self-report measure for defence mechanisms (Chabrol et al., 2005). In the context of the current study, face validity specifically refers to

assessing whether each item of the adapted measures appears valid (i.e. on its face) compared to the original item. As these measures were going to be administered to participants in a shelter-type setting, which can be loud and chaotic with limited time available, it was important to assess whether administering them in this setting was a realistic possibility. Similarly, because they are self-administered questionnaires, it was crucial to ensure that they could be understood by the target populations, which is why their comprehensibility was assessed. Because they were altered, before administering the measures to the samples, it was necessary to ensure that they were reliable, which is the second objective. The purpose of the third objective was to determine if the measures were able to mathematically distinguish between samples of two populations (i.e. long-term dog owners and dog relinquishers). The measures' ability to do so would potentially allow differences in levels of behavioural flexibility between the populations to be recognized. The purpose of the fourth objective was to ensure that the measures were able to assess consistently at different points in time. As was discussed in Chapter 1, Windle and Lerner (1986) theorised that while one's behavioural acts may change at different points in time, temperamental styles, which the measures are assessing, should remain constant over the course of one's lifetime. As with the second objective, because they were altered, it was necessary to investigate the long-term stability of the measures. The purpose of the fifth objective was to determine if adopters who scored in a particular manner on the measures at the point of adoption would lead to successful dog placements. Objectives three, four, and five may provide evidence that the measures could be useful as part of the rehoming process for potential adopter screenings. (See Tables 4.1 and 4.2 for the original and adapted versions of the measures.)

4.2. Methods

4.2.1. The adaptation of measures to assess conflict resolution potential and behavioural flexibility in adopters

As was discussed in Chapter 1, this thesis hypothesises that because conflict can be expected to arise at some point over the course of the dog-owner relationship, so the ability to resolve conflict (i.e. one's "conflict resolution potential") is central to the success of the relationship. The current research further theorises that key to one's "conflict resolution potential" is behavioural flexibility, but there are currently no measures or tools to assess conflict resolution potential in dog adopters, dog relinquishers, or long-term dog owners published in the scientific literature. However, in a parallel body of research in the field of social sciences a suite of measures, the multi version Dimensions of Temperament – Revised, has been used to assess flexibility with a population of human foster parents (Doelling & Johnson, 1990; Windle & Lerner, 1986). Moreover, the role of temperament has been evaluated in research on both shelter dog rehoming and on human foster child placements (e.g. De Palma et al., 2005; Green et al., 1996). As was noted in Chapter 1, there are several parallels between the dog-owner relationship and the human foster child-foster parent relationship, such as the potential ease with which both relationships can be dissolved. Due to these parallels, this widely cited suite of measures was used and adapted for the purposes of this research. Indeed these measures were designed according to the original context set out by Doelling & Johnson (1990) "*…to examine the extent to which a foster parent-foster child temperament mismatch might be predictive of foster placement outcome*". A third measure, the Foster Placement Evaluation Scale, was also used (Doelling, 1989; Doelling & Johnson, 1990). This specific tool was developed to measure the success of placements. The areas covered, such as physical care and acceptance of

the child, appear similar and relevant to the dog-owner relationship, and have the potential to be adapted for measuring the success of dog placements.

Two versions of the same questionnaire-style measure were used for the purpose of assessing behavioural flexibility in the human samples involved in this research (i.e. dog adopters, dog relinquishers, and long-term dog owners): The Dimensions of Temperament – Revised (DOTS-R) (Windle & Lerner, 1986). Both versions contained 54 items, and the nature of the items was the same. The first version, the DOTS-R Adult, a self-assessment of features of temperament understood to be present from early childhood through adulthood, was not adapted and was used in its original format (see Appendix C). The other version, the DOTS-R Child Expectations (Doelling, 1989; Doelling & Johnson, 1990) (see Appendix D), which measures one's expectations of child behaviour, was adapted for the purpose of assessing dog owners' expectations of dog behaviour. All 54 items of the DOTS-R Child Expectations were rewritten to be applicable to the dog-owner relationship. Some items in the original version could be adapted by merely be changing the subject of the item from "child" to "dog" (e.g. "I expect a child to move around a lot." was changed to "I expect a dog to move around a lot."). Other items required additional amendment to be relevant to dog behaviour (e.g. "I expect a child to laugh and smile at a lot of things." was changed to "I expect a dog to wag his or her tail and show excitement at a lot of things."). However, at this initial stage of item rewriting, a key aim was to maintain the integrity of the original items as far as possible, so amendment was kept to a minimum. After all items were rewritten, a multi-stage iterative process employing a modified Delphi method was used to try to build a consensus from three panels of experts: dog behaviour scientists (n=4), dog rehoming experts (n=9), and dog adopters (n=14). The panels

of experts helped to ensure that: the adapted measures had face validity relative to the original measures at the item level, the measures were feasible to administer in a rescue centre setting, and that they were comprehensible by the target population (i.e. dog adopters). In brief and in its more traditional format, a Delphi method uses the collective judgments or feedback from a panel of experts for the purpose of predicting future events (Reber & Reber, 2001). It involves an iterative process of feedback gathering in order to arrive at as close to an expert consensus as possible. Since its development, it has been used in wide-ranging fields of study, such as animal welfare, information systems, and human healthcare to achieve this goal (e.g. Collins et al., 2012; Elwyn et al., 2006; Phythian et al., 2011; Skulmoski, Hartman, & Krahn, 2007).

A third measure, the Foster Placement Evaluation Scale (FPES) (Doelling & Johnson, 1990), was also adapted to be relevant to the dog-owner relationship (see Appendix F). In its original context, it was used for assessing a human foster child's placement into a new home, and the placement's success or lack thereof. The areas addressed in the original version included physical care, affection, acceptance of the child, equal treatment of the child and other children in the home, ability to get along with the child's natural parents, ability to deal with behaviour problems, awareness of the child's individual needs, amount of time spent playing with the child, amount of time spent in general with the child, the child's academic performance and behaviour in school, quality of the child's relationships with other children in the home, and the child's degree of adaptation to the family structure. The original version of the measure contains ten items, and uses a 1-5 point Likert scale to rate agreement with each item. Each item is in the form of a statement, which the rater uses to assess various aspects of the foster child-foster parent

relationship including how the child is coping in the new setting and the relationship between the foster parent and child. In the adapted version of the measure, an additional two items were added (*the owner is aware of how the dog signals his/her needs*, and *the dog shows interest in other family members living in the house [children, grandparents, etc.]*), as the breadth of the original ten items did not seem to sufficiently encompass all aspects of a dog's placement into a new home. The rating scale for each item was also adapted to be relevant to the dog-owner relationship. Qualifying criteria, which were not present in the original were added for each point on the scale (e.g. Item 1: *The owner spends an adequate amount of time engaging in activities that the dog finds enjoyable*; rating criteria: 5=strongly agree [owner spends multiple periods of time everyday engaging in such activities], 4=slightly agree [owner spends limited time daily engaging in such activities], 3=neither agree nor disagree, 2=slightly disagree [owner spends limited time engaging in such activities, but not daily or on a consistent basis], 1=strongly disagree [owner spends no time engaging in such activities]). Both the adapted items and the adapted rating scale then went through the same modified Delphi method as was followed for the DOTS-R and DOTS-R Child Expectations. The original items alongside the adapted items were sent via email to panels of experts in the same iterative process.

4.2.2. Assessment of face validity of the three adapted measures using an expert panel

Face validity refers to whether the contents of a test seem appropriate at face value, which is typically assessed by experts from the relevant field (Reber & Reber, 2001). The DOTS-R Child Expectations and the Foster Placement Evaluation Scale (FPES) containing rewritten items were sent to the panel of dog behaviour scientists in order to assess face validity, given their experience and accomplishments in the

field (e.g. academic papers published), which provided evidence of their knowledge of the material in question. They were recruited via an email enquiry asking if they would be willing to participate in research on dog rehoming. They were asked to assess face validity by comparing the adapted items to the original ones. An Excel spreadsheet was used to organise the original items and the rewritten items of each measure, which was emailed to the panel. The two sets of items were listed in adjacent columns, followed by a column in which each member of the panel was asked to determine if the item contained face validity. They were asked for a binary yes/no response to this question. In a separate column, the panel was asked to provide recommendations for change if they determined the item did not have face validity. Similarly for the FPES, the ten original items were listed in adjacent columns of an Excel spreadsheet next to the adapted items including the two additional items. As with the DOTS-R Child Expectations, members of the panel were asked if each item had face validity, and if not what recommendations for change they had to make them valid. However, for the FPES, they were also asked to assess the qualifying criteria for the item scoring, and provide recommendations for change for each criterion that was not deemed valid. In the original version of the FPES, the rating scale did not contain any qualifying criteria for each item, and one general scale was used for all items (i.e. 1=strongly disagree, 2=slightly disagree, 3=neither agree nor disagree, 4=slightly agree, 5=strongly agree). In the adapted version the scale was reversed in order to match the direction of the scoring scale in the DOTS-R (i.e. 1=strongly agree to 5=strongly disagree). In order to aid whoever is completing the FPES and to provide evidence for how they rate each item, qualifying criteria were added to the rating scale and each item was given its own scale (e.g. for the item, *The owner shows appropriate levels of affection to the*

dog., 1=strongly agree [the owner shows appropriate levels of affection to the dog consistently] to 5=strongly disagree [the owner does not ever show appropriate levels of affection to the dog]). After each member of the panel had submitted their responses and recommendations for change, the feedback was compiled. This process took place over two months (i.e. April – May 2013). In some cases, panel members determined an item had face validity but still provided recommendations for change. This was also the case for the two supplemental items on the FPES; the panel was not asked if those items had face validity, as there were no original items to which they could be compared, but they were still asked to provide recommendations for change. Any items or item scoring criteria in which all members of the panel unanimously agreed contained face validity were set aside and deemed ready to take forward to the next phase. For those items whose face validity the panel disagreed on, recommendations for change were compiled and items were amended based on this feedback. The newly adapted items were sent to the panel a second time, who were once again asked if they thought they had face validity. This iterative process continued for three rounds until no further consensus could be achieved on any remaining items. At that point, it was determined how the items could be amended a final time to satisfy the recommendations for change for the majority of the panel. For the DOTS-R Child Expectations, a consensus on face validity could be reached amongst the panel for 26 items. Three of the four panel members came to a consensus that an additional 24 of the items had face validity. Two of the four panel members came to a consensus that a final four items contained face validity. Recommendations for change at the item level varied widely, ranging from minor issues with item wording to more fundamental issues with dog behaviour as it related to the adapted items in comparison with the original

items concerning child behaviour. (See Table 4.1 for original items and adapted items; see Appendix E for the complete adapted version including instructions.)

For the FPES, a consensus could be reached amongst members of the panel that four of the items had face validity. Three of the panel members came to consensus that an additional five items had face validity, and two of the panel members agreed that the final item contained face validity. (See Table 4.2 for original and adapted items; see Appendix G for the complete adapted version with instructions.) Once this process was completed, they became the new potential instruments to be used for assessment alongside the unmodified DOTS-R Adult. The adapted DOTS-R Child Expectations was called the *Canine Adopter Expectations Survey (CAES)* and The Foster Placement Evaluation Scale was called the *Dog Adaptation of Foster Placement Evaluation Scale (DPES)*.

Table 4.1

DOTS-R Child Expectations original items adapted to CAES items

Item number	Original item	Adapted item
1	I expect that it will take a child a long time to get used to a new thing in the home.	I expect that a dog may have difficulty adapting to a novel thing in the home, such as a new baby, building works, or redecoration.
2	I expect that a child won't be able to stay still for long.	I expect that a dog may not be able to stay calm for long periods of time.
3	I expect a child to laugh and smile at a lot of things.	I expect a dog to wag his or her tail and show excitement at a lot of things.
4	I expect a child to wake up at different times.	I expect a dog to bark and disturb me sometimes.
5	Once a child is involved in a task, I expect nothing will distract him or her form it.	Once a dog is involved in a task, I expect nothing will distract him or her from it.
6	I expect a child to persist at a task until it's finished.	I expect a dog to persist at a task until it's finished.
7	I expect a child to move around a lot.	I expect a dog to move around a lot.
8	I expect a child to make him/herself at home anywhere.	I expect a dog to make him/herself comfortable all around the home.
9	I expect a child will always be distracted by something else, no matter what he or she may be doing.	I expect that it will be easy for a dog to get distracted by something else.
10	I expect a child to stay with an activity for a long time.	I expect a dog to be able to stay with an activity for a long time.
11	If a child has to stay in one place for a long time, I expect he/she to get very restless.	I expect that a dog may get restless if required to stay settled for a long time.
12	I expect a child to move toward new objects shown to him/her.	I expect a dog to show interest in new things in the environment.
13	I expect a child to take a long time to adjust to new schedules.	I expect a dog to take a long time to adjust to changes in his/her schedule or to other individuals' schedules.
14	I expect a child will not laugh or smile at many things.	I expect a dog will not wag his or her tail or show excitement at many things.
15	If a child is doing one thing, I expect that something else occurring won't get him/her to stop.	If a dog is doing something, I expect that something else occurring won't get him/her to stop.
16	I expect a child to eat about the same amount of dinner whether he/she is home, visiting someone, or traveling.	I expect a dog to usually have a consistent appetite at or away from home.
17	I expect a child's first reaction to be to reject something new or unfamiliar to him/her.	I expect a dog to initially avoid something new or unfamiliar to him/her.
18	I expect that changes in plans will make a child restless.	I expect that changes in routine or environment will make a dog stressed.
19	I expect a child to often stay still for long periods of time.	I expect a dog to often stay still for long periods of time.
20	I expect that things going on around a child will not take him/her away from what he/she is doing.	I expect that things going on around a dog will not stop him/her from carrying on with what he/she is doing.
21	I expect a child to take a nap, rest, or break at the same times every day.	I expect a dog to rest at the same times every day.

Item number	Original item	Adapted item
22	Once a child takes something up, I expect he/she to stay with it.	When a dog starts to do something determinedly, I expect him/her to be difficult to interrupt from doing this.
23	Even when a child is supposed to be still, I expect he/she to get very fidgety after a few minutes.	Even when I want a dog to be calm, I expect that a dog will soon get restless.
24	I expect a child to be hard to distract.	I expect that it will be hard to distract a dog.
25	I expect a child to usually get the same amount of sleep each night.	I expect a dog's sleeping patterns to be consistent.
26	On meeting a new person I expect a child to tend to move toward him or her.	On meeting a new person or animal I expect a dog to tend to move toward him or her.
27	I expect a child to get hungry about the same time each day.	I expect a dog to anticipate mealtimes at the same time each day.
28	I expect a child to smile often.	I expect a dog to show he/she is happy a lot of the time.
29	I expect a child to never seem to stop moving.	I expect a dog to never seem to stop moving.
30	I expect it will take a child no time at all to get used to new people.	I expect it will take a dog no time at all to get used to new people.
31	I expect a child to usually eat the same amount each day.	I expect a dog to usually eat the same amount each day if fed their usual food.
32	I expect a child to move a great deal in his/her sleep.	I expect a dog to change his/her position during sleep.
33	I expect a child to get sleepy just about the same time every night.	I expect a dog to get sleepy just about the same time every night.
34	I expect not to find a child laughing often.	I expect not to find a dog wagging his/her tail and showing excitement often.
35	I expect a child to move toward new situations.	I expect a dog to move toward new situations.
36	When a child is away from home, I expect he/she will still wake up at the same time each morning.	When a dog is away from home, I expect he/she will still wake up at the same time each morning.
37	I expect a child will eat about the same amount at breakfast from day to day.	I expect a dog will usually eat about the same amount at meals.
38	I expect a child to move a lot in bed.	I expect a dog will change his/her position in bed a lot.
39	I expect a child to feel full of pep and energy at the same time each day.	I expect a dog to be full of pep and energy at the same time each day.
40	I expect a child to have bowel movements at about the same time each day.	I expect a dog to have to relieve him/herself at about the same time each day.
41	No matter when a child goes to sleep, I expect him/her to wake up at the same time the next morning.	No matter when a dog goes to sleep, I expect him/her to wake up at the same time the next morning.
42	In the morning, I expect a child to still be in the same place as he/she was when he/she fell asleep.	In the morning, I expect a dog to be where I left him/her the night before.
43	I expect a child to eat at about the same amount of supper from day to day.	I expect a dog to eat about the same amount at meals each day.
44	When things are out of place, I expect it will take a child a long time to get used to it.	I expect it will take a dog a long time for a dog to get used to things being moved to new locations around the home.
45	I expect a child to wake up at the same time on weekends and holidays as on other days of the week.	I expect a dog to wake up at the same time on weekends and holidays as on other days of the week.

Item number	Original item	Adapted item
46	I expect a child to not move around much at all in his/her sleep.	I expect a dog to not move around much at all in his/her sleep.
47	I expect a child's appetite to stay the same day after day.	I expect a dog's appetite to stay the same day after day.
48	I expect a child's mood to be generally cheerful.	I expect a dog to generally be in a good mood.
49	I expect a child to resist changes in routine.	I expect a dog to not easily adapt to changes in routine.
50	I expect a child to laugh several times a day.	I expect a dog to show signs of happiness several times a day.
51	I expect a child's first response to anything new to be to move his/her head toward it.	I expect a dog's first response to anything new to be to investigate it.
52	I expect a child to be generally happy.	I expect a dog to be generally happy.
53	I expect the number of times a child has a bowel movement on any day will vary from day to day.	I expect the number of times a dog has to relieve him/herself on any day will vary from day to day.
54	I expect a child will never be in the same place for long.	I expect a dog to be constantly moving about when they are awake.

Table 4.2

FPES original items adapted to DPES items

Item number	Original item	Adapted item
1	The foster parent(s) spends an adequate amount of time with child in fun activities.	The owner spends an adequate amount of time engaging in activities during which the dog shows signs of enjoyment or excitement.
2	The foster parent(s) treats the child equally well to the other children in the home.	The owner treats all dogs in the house equally well.
3	There is ample affection shown between the foster mother and the child.	There is ample affection shown between the owner and the dog.
4	There is ample affection shown between the foster father and the child.	There is ample affection shown between all other family members who have dog-related responsibilities and the dog.
5	The child seems to enjoy spending time with the other children in the home.	The dog seems to enjoy spending time with others in the home.
6	The foster parent(s) adequately takes care of the medical and other needs of the child (food, clothing, other appts., etc.).	The owner adequately takes care of the medical and other needs of the dog (food, exercise, etc.).
7	The foster parent(s) is able to deal effectively with difficult behaviors the child exhibits.	The owner is able to deal effectively with the difficult behaviours the dog exhibits.
8	The foster parent(s) shows an attitude of acceptance toward the child regardless of his/her behavior.	The owner shows an attitude of acceptance toward the dog regardless of his/her behaviour.
9	The child seems to have adapted well to the family situation.	The dog seems to have adapted well to the home environment, including the family situation.
10	The foster parent(s) is receptive to and aware of the child's individual needs.	The owner is receptive to and aware of the dog's individual needs.
11	n/a	The owner is aware of how the dog signals his/her needs.
12	n/a	The dog shows interest in other family members living in the house (children, grandparents, etc.).

4.2.3. Assessment of the feasibility of administration of the adapted measures in a shelter / rehoming centre setting using an expert panel

These three measures, the DOTS-R, the CAES, and the DPES including instructions for assessment, were then sent via email to a panel of experienced dog rehomers (e.g. animal rescue workers, dog shelter managers, etc.). The panel was recruited from a database of animal shelters, rehoming organisations, and rescue centres held by the Association of Dogs and Cats Homes (www.adch.org.uk/membership/current-members/). Staff and volunteers from these organisations, who had contributed to other studies as part of this project (see

Chapters 2 and 3), were contacted and asked if they would be willing to contribute to this research on dog rehoming by being part of this panel. As part of the written enquiry in the aforementioned study, organisations were asked if they would be interested in giving input and feedback on the creation of measures to be used in the rehoming process. Of the organisations that provided information for that study (n=82), nine respondents were willing to contribute to this study. This panel helped to establish the feasibility of administration of the measures. As one of the objectives of this project is the future practical applications and usage of the DOTS-R, the CAES, and the DPES in shelter, rehoming centre, and rescue organisation settings, as part of the assessment of their validity, it was imperative that their feasibility of administration in real life settings be established. Along with the three measures, instructions were sent explaining the purpose of the panel's role in the research, the background of the original measures, and the aims of the research overall.

The members of the panel were asked how much time their organisation spends assessing a potential adopter before offering them a dog, and if they conducted multiple assessments, then what the total time was. For the CAES and for the DOTS-R, the panel was asked to assess the feasibility of the measures in three respects:

1. Do they feel that it would be feasible to administer this questionnaire to somebody who is looking to adopt a dog at their organisation in terms of such factors as resource availability, time constraints, and convenience?
2. If not, why do they think it is infeasible. Do they think the administration of any questionnaire is feasible at this time?

3. Do they have any recommendations for change that would make them sufficiently feasible to administer?

For the DPES, the panel was asked to assess the measure in three similar respects to the other measures:

1. Do they feel that this measure is a tool that could ever be used within their organisation to measure the success of a dog placement?
2. If not, why?
3. Do they have any feedback on this measure and its aim?

Based on the input from the second panel, action points were compiled in response to the issues and concerns raised. The action points were sent to the panel. There was considerable overlap between the concerns in feasibility of administration between the DOTS-R and the CAES. The issues raised primarily related to the seemingly personal nature of some items, the length of the questionnaires, and the lack of obvious relevance of some items and/or the overall questionnaires to the dog rehoming process. One issue, which warranted further consideration related to the scoring system. However, after contacting one of the authors of the original measures, (Windle, Tufts University), and consulting other research that employed the measures in the context of foster child placement, it was decided that the concerns over scoring should not be problematic or prohibitive in practice (M. Windle, personal communication, August 10, 2015).

Three members of the panel felt that the CAES would be feasible to administer, although two of them felt that its length might be an issue in terms of adopters completing it. Two other panel members felt that it would maybe be feasible to administer; one suggested that the items were too subjective and one felt that adopters might find the questionnaire too daunting. The final two panel

members did not feel that the CAES would be feasible to administer. Reasons for this decision included the questionnaire being too long, the personal nature of some of the items, and the lack of direct relevance to dog adoption and the suitability of a family. Recommendations for change varied, but those specifically aimed at improving the CAES itself, as opposed to creating an entirely different questionnaire, were focused on simplifying the questions and their structure.

One member of the panel felt that the DOTS-R would be feasible to administer. One member felt that it would maybe be feasible to administer, and five members felt that it would not be feasible to administer. (One member did not respond to this question for the DOTS-R.) Reasons given for it not being feasible to administer included: the nature of the items being too personal and intrusive, it would not allow an understanding of the lifestyle of the family, and it would not fit in with an organisation's personal approach. Only one panel member definitively stated that they felt any type of questionnaire would be feasible to administer as part of their adoption process. Five panel members provided recommendations for change for the DOTS-R. The recommendations could be divided into two categories:

1. amending the questionnaire so that it does not need complex data analysis or a trained rater or scorer to administer it and evaluate the responses, and
2. changing the nature of the items in general to be more relevant to the dog-adopter matching process and to gather information about the adopter and their lifestyle.

Five members of the second panel felt that the DPES was feasible to administer in its intended setting, and had quite positive feedback on the measure itself and potential applications for its usage. A sixth member felt that it might be

feasible to administer, due to the possibly subjective nature of item interpretation based on the qualifications of the person conducting the assessment and the nature of any issues going on with the dog in the home (e.g. specific behaviour problems). However, this panel member still had positive feedback relating to the assessment of a dog's interactions with all family members. One member of the panel felt that it would not be feasible to administer due to the amount of time it would take to observe a dog in the home, but still felt if time permitted it would be a good assessment to conduct. The final panel member also thought it was infeasible as they felt it would require a third party to visit the dog in the new home, which is not something their organisation had the resources to do, and also because some dog adopters do not want further contact post-adoption and might find home visits intrusive. Despite this, that panel member still felt that the measure would be interesting to carry out on a small sample of adopted dogs, just infeasible with all the dogs they adopt.

All of the feedback from the second panel for the CAES, DOTS-R, and DPES was then compiled, and a set of action points to address the points raised was created and sent to the panel members. The feedback for the CAES was divided into five action points. Background information or justification for each of the action points was provided for the three measures, as well as amendments that will be made going forward in later stages of the project:

1. Questionnaire is too long:

    In order to preserve the measure's validity in adapting it from its original form, the same number of items were retained; however, one of the goals of both the next stage of the adaptation process and by administering it to a sample of dog adopters, is to refine the measure and

remove any items found to be unnecessary, thereby making it as short as possible.

2. Complexity of items / wording of items:

   The next stage of the adaption process of this measure addresses its comprehensibility by the target audience (dog adopters), so items (questions) that are confusing or not easily understood, such as those with double negatives, will be omitted as needed.

3. Scoring / evaluating of questionnaire would require somebody experienced or trained:

   This will need to be addressed later in the research when the measure is further refined, i.e. training for implementation.

4. Questionnaire too personal:

   Prior to administering the measure to all participants, they would be briefed on the nature of the questionnaire and its purpose as a research instrument; all participation is completely voluntary, and they have the right to withdraw at any point. Refinement may also remove some personal items not found to be necessary.

5. Items do not address suitability of the family and their lifestyle:

   This questionnaire does not aim to replace the organisations' normal rehoming procedures (questionnaires, interviews, etc.), but instead to be used to complement them.

Feedback for the DOTS-R was divided into four action points:

1. Items are too personal:

Similar to above, all participants would be briefed prior to completing the questionnaire, and participation is voluntary; items may be lost if not important in the refinement process.

2. Items are irrelevant:

   In order to retain the measure's validity, it was used in its original form; items that are found to be irrelevant and unnecessary will be omitted during the next stage of the adaptation process, and through statistical analysis following its administration to a sample of dog adopters.

3. Nature of questionnaire might deter people from adopting a rescue dog:

   By removing items found to be unnecessary as described above, the nature of the measure as a whole may well evolve to become more approachable by adopters and less off-putting.

4. Items do not directly relate to dog-adopter matching process:

   As described above in response to similar feedback on the Canine Adopter Expectation Survey, for the purposes of this research, this measure is to be used with organisations' normal rehoming procedures.

The structure of the action points in response to feedback on the DPES was different as it was not to be used in the same way as the other two questionnaires; they were grouped together:

The purpose of this measure in terms of this research is still undecided; as much of the panel agreed, it has potential as a post-adoption assessment tool, but still concerns were raised, such as time and resource constraints for administration, rating of items could be open to interpretation, adopters sometimes do not want further contact post-adoption, and the nature of the items may be too intrusive. It is a possibility that this measure will only be

used for research purposes in order to assess the successfulness of a dog placement. However, if it is decided that this measure has potential beyond this research as an assessment tool, this feedback is extremely useful.

4.2.4. Assessment of the comprehensibility of the DOTS-R and the CAES by the target audience using two expert panels

The recruitment process for the third panel took place using two convenience samples, one in the UK (n=7) and one in the US (n=7). The panel in the UK was recruited at a rehoming centre; all participants had been approved to adopt a dog and were attending a pre-adoption information meeting prior to picking up their dog. The panel in the US was recruited at a rescue organisation's adoption event, which was open to the public. Participants were either potentially interested in adopting a dog or were in the process of adopting one. By using these two diverse panels the validity of the measures with the target population was expected to be increased. All panel members were given a copy of the DOTS-R and the CAES in the format that they would be given to the future sample of dog adopters, and were asked to read through them including the instructions for completion. They were not instructed to complete the questionnaires. (The DPES was omitted from this phase of the validation process, as it would not be administered as part of the adopter screening process.) The panel members were then asked to indicate any items that were unclear or that they did not understand. Overall, there were no particular items flagged as being difficult to understand by either panel, so no items were changed. The primary issue was with the wording of the instructions for completion. Based on this feedback, minor revisions were made. The other two aspects of the measures that raised some concern had to do with the questionnaires' scoring system and the redundancy of some of the items. Because the measures had been previously validated for their original purpose (Doelling & Johnson, 1990; Windle & Lerner,

1986), altering the scoring system or removing redundant items could affect validity at this time. As such, it was decided that this feedback would be noted, but no changes would be made at this point in the study.

Once this three-stage process of assessing the three measures' validity was completed, it was determined that the questionnaires were ready to be taken forward to the next stage of the research. The DOTS-R and the CAES were to be administered to three samples of human participants. It was determined that due to time and resource constraints, administration of the DPES was outside the scope of the current research. Because it went through the validation process, it is however ready to be used as part of future research. The positive feedback received from the panels regarding its usefulness as a post-adoption assessment tool suggests that it should be employed in future studies, and ultimately may have very useful practical applications in the rehoming process.

Although the DOTS-R and the CAES were two versions of the same measure in their original format, henceforth they will be referred to as two separate measures. (See Table 4.1 for the original and adapted versions of the measure.)

Table 4.3

Original and adapted measures to assess conflict resolution potential and behavioural flexibility in adopters

Original version	Number of items in original version	Adapted version	Number of items in adapted version
Dimensions of Temperament Survey – Revised Adult (DOTS-R Adult)	54	(unadapted – the original version was used)	n/a
Dimensions of Temperament Survey – Revised Child Expectations (DOTS-R Child Expectations)	54	Canine Adopter Expectations Survey (CAES)	54[1]
Foster Placement Evaluation Scale (FPES)	10	Dog Adaptation of Foster Placement Evaluation Scale (DPES)	12

[1] Does not reflect the number of items found to be reliable (see subsection 4.3.1.2)

4.2.5. The development of the Dog Owner Satisfaction Survey

As no suitable measures could be found in the literature to assess dog owner satisfaction, a survey was created for this purpose in which participants were asked to rate their relationship with their dog. The survey was based on the eight dimensions of the human-dog relationship as described by Mills, van der Zee, and Zulch (2014). The dimensions they outlined were:

1. the content of interactions within the relationship,
2. the diversity of interactions contained within the relationship,
3. the level of reciprocity versus complementarity of interactions within the relationship,
4. the quality of the interactions within the relationship,
5. the frequency and patterning of interactions within the relationship,
6. the intimacy of a relationship,
7. cognitive perspectives of the interactions, and
8. multidimensional qualities.

The survey contained nine items with a forced-choice Likert-style rating scale in which a dog owner assessed their relationship with their dog from the owner's perspective in terms of level of satisfaction (i.e. 'completely satisfying', 'mostly satisfying', 'mostly dissatisfying', 'completely dissatisfying') with first-person statements. A 1-4 numeric score was assigned to each level of satisfaction (e.g. "mostly satisfying" = 4, "completely dissatisfying" = 1), so greater satisfaction is equated to a higher score, with a maximum total survey score of 36. The survey was not designed for dog owners to take into account the quality of the relationship from the dog's (supposed) perspective; it only addressed how the owner felt about the relationship:

1. The content of interactions with my dog is _____.
2. The range of ways my dog and I interact is _____.
3. The way in which my dog reciprocates and complements my interactions with him/her is _____.
4. The style of my dog's behaviour when we interact is _____.
5. The frequency of interactions between my dog and me is _____.
6. My level of emotional closeness to my dog is _____.
7. My dog's motives or intentions for his/her behaviours are _____.
8. My dog's personality and temperament are _____.
9. Overall, my relationship with my dog is _____.

4.2.6. Sample recruitment and administration of measures

4.2.6.1. Long-term dog owners

The sample of long-term dog owners was recruited anonymously online. A long-term dog owner was defined as an individual who had owned their dog for at least three years. Participants were recruited via word of mouth, from social media,

and stemming from interviews conducted with various publications (e.g. Scientific American) about the overall research project. Participants were made aware of the general purposes of the study at the beginning of the survey, and were given additional information upon its completion; they participated via an online survey platform (Qualtrics) (see Appendix H for informed consent form). In addition to the demographic questionnaire, the DOTS-R, and the CAES, participants were also asked to complete the Dog Owner Satisfaction Survey (see Appendix I for long-term dog owner demographic data questionnaire). Participants were made aware that they would be contacted two additional times via email and asked to complete the surveys again; they were asked to provide their email address to be contacted for this purpose. Those who provided their email address were sent a link for a follow-up survey approximately two weeks after their initial survey completion. They were emailed again approximately three months after their initial survey completion with a link to complete the surveys a final time. The demographic questionnaire was not included as part of the follow-up surveys.

4.2.6.2. Dog relinquishers

The sample of dog relinquishers was also recruited anonymously online. A dog relinquisher was defined as an individual who has ever relinquished a dog or dogs at any point in the past for any reason, even if they currently had a dog. They were recruited by the same means as the sample of long-term dog owners, were made aware of the purpose of the study in the same manner, participated via an online survey platform (Qualtrics), and were asked to provide their email address to retake the surveys (see Appendices J and K for informed consent document and demographic data questionnaire). They were emailed links to retake the survey twice, approximately two weeks and approximately three months later.

4.2.6.3. Dog adopters

The sample of dog adopters was recruited in person at the point of adoption. In order to accomplish this, the database of rehoming organisations in the US that was used in Chapters 2 and 3 was contacted via email to ask if they would be willing to participate in this study by helping to recruit people currently adopting a dog from them. A total of 248 animal shelters and rehoming organisations were contacted between August 2014 and April 2015, with the goal of achieving a final sample size (i.e. each participant completed all relevant paperwork) of n=100, which has been used as a sample size in other similar academic studies (e.g. Shore, 2005). In the initial enquiry organisations were informed of the general purposes of the study, and also made aware that participant recruitment would not infringe on their usual adopter screening and rehoming process. The principal investigator of the study would either be present when dog adoptions were occurring to recruit participants, or if the organisation was willing, they would recruit participants on behalf of the principal investigator. In either scenario, the participants were given a paper copy of the informed consent document, a demographic data questionnaire, the DOTS-R, and the CAES (see Appendices L and M for informed consent document and demographic data questionnaire). As part of the informed consent, they were notified that they would be contacted via email approximately six months post-adoption and asked to retake the surveys. Participants were given the option of completing all of the paperwork on site, or they were given a postage paid return envelope with written instructions asking them to post the packet of paperwork back within seven days' time.

Approximately six to twelve months after they had adopted their dog, participants were contacted a second time via email; they were asked to complete the DOTS-R and the CAES again. They were also asked to complete the Dog

Owner Satisfaction Survey at that time, as well as what the status of their dog was (i.e. if they still had their dog). If they did not still have their dog, they were asked what happened to him/her in the form of a multiple choice question:

- Rehomed to another person/family
- Returned to rescue organisation/shelter
- Deceased
- Other_____ (fill in response)

Follow-up surveys and paperwork were sent electronically, but participants were given the option of hard copies being posted to them with a postage paid return envelope.

The dog adopter sample was only used for the prospective analysis involved in this study, i.e. to assess whether the measures have adequate predictive validity of successful dog placements (see subsections 4.2.7.4 and 4.3.4). This sample was not used in other analyses because the purposes of those, following an assessment of the measures' reliability, was to determine if they were able to mathematically differentiate between distinct and established populations, i.e. those who had kept a dog for a long period of time and those who had a relinquished a dog, and then to determine if they were stable in their assessment abilities over time. These analyses were done in preparation for the prospective component of the study involving the dog adopter sample.

4.2.7. Data analysis

The methods used for data analysis begin with reliability analysis and are divided by objective. Data gathered via Qualtrics (i.e. for the long-term dog owner sample and the dog relinquisher sample) was downloaded into Excel and uploaded into SPSS (version 25), which was used for all statistical analyses unless noted

otherwise. Data gathered from the dog adopter sample was also entered into Excel and uploaded into SPSS. The level of significance used for all analyses was p = .05.

4.2.7.1. Assessment of the reliability of the DOTS-R and the CAES

Windle and Lerner (1986), the authors of the Dimensions of Temperament Surveys, used factor analysis on the 54-item DOTS-R to reveal a nine-dimension model for the adult version of the measure, and a ten-dimension model for the child expectations version, which was adapted to the CAES. Responses from the sample of long-term dog owners and dog relinquishers were used for factor analysis in an attempt to replicate the original factor structures. A series of iterative exploratory and confirmatory factor analyses were conducted using a direct oblimin rotation. An oblique rotation was used as it was presumed that the authors of the original measures determined the items to be correlated (Field, 2009); a direct oblimin rotation was chosen as it is a widely used oblique rotation (Osborne, 2015). The commonly used cut-off point of +/- 0.4 for factor loadings was used for all analyses (Budaev, 2010). In order to statistically compare the scores of each sample, an independent samples T-test was conducted for each of the DOTS-R scales. Item to total factor score bivariate correlations were conducted using a Pearson correlation coefficient for the DOTS-R as the scores were normally distributed, and a Spearman correlation coefficient was used for the CAES as the scores were not normally distributed (Field, 2009). All items that required reverse coding were done as necessary, as per the measure's original scoring instructions (Windle & Lerner, 1986). A Mann-Whitney test was used to compare scores for individual survey items between the two samples. Those items that differed statistically were deemed useful and were taken forward for further analyses.

4.2.7.2. Assessment of whether long-term dog owners are significantly more behaviourally flexible than dog relinquishers

Building on the analysis done to establish the reliability of the measure (as described in the previous subsection), the samples' mean summed scores on the CAES were evaluated to determine a cut-off point between the long-term dog owner sample's scores and the dog relinquisher sample's scores. Mean scores were plotted and graphed on a scatterplot; the intersection of the samples' mean scores was used at the cut-off point.

4.2.7.3. Assessment of the long-term stability of the CAES

Data from the subset of the long-term dog owner sample that completed the CAES three times (i.e. initially and two retests) was used to assess the long-term stability of the measure. Participants who had completed the initial survey and only one retest but not the other were excluded from this analysis, as were participants who had missing data on survey items. Concordance correlations were used to assess participants' item scores between the initial survey and the retests; only survey items found to be reliable were included in the analysis (Correction: A Note on the Concordance Correlation Coefficient, 2000; Lin, 1989). Concordance correlations were computed using R (version 3.4.1) using the CCC function in the DescTools package (Signorell, 2019). This type of bivariate correlation was used as it is well suited to account for differences in sets of values, which a Pearson or Spearman correlation is not as able to do (Lin, 1989). Three relationships between the surveys were analysed:

1. initial CAES versus first retest (completed approximately two weeks after initial),
2. initial CAES versus second retest (completed approximately three months after initial), and

3. first retest versus second retest.

Significant concordance correlation between the tests and retests would indicate that the measure had good long-term stability.

4.2.7.4. Assessment of whether the CAES has adequate predictive validity in order to predict which dog placements have long-term success

Data from the subset of the dog adopter sample that completed the initial CAES at the point of adoption and also completed the retest approximately six months post-adoption was used to assess the predictive validity of the survey. Those participants also completed the Dog Owner Satisfaction Survey with the CAES retest; participants who had not completed both or had missing survey items were excluded from this analysis. For the purpose of this analysis and to meet this objective, the long-term success of a placement was qualified by an adopter's level of satisfaction with their dog as measured by the Dog Owner Satisfaction Survey. In order to first ensure that the Dog Owner Satisfaction Survey had good long-term stability, a concordance correlation was conducted using the same subset of long-term dog owners as described in the previous subsection, who also completed this survey three times (i.e. initially and two retests). The same three relationships (as described in the previous subsection) between the initial survey and retests were analysed. In order to then assess the predictive validity of the CAES, a two-tailed Spearman correlation was conducted with the total scores from the CAES and the Dog Owner Satisfaction Survey from the subset of the dog adopter sample. Initial CAES scores were correlated with the Dog Owner Satisfaction Survey scores, which were completed approximately six months post-adoption. As a basis of comparison and a control sample, the same correlation was conducted using the subset of the long-term dog owner sample who completed the initial surveys and retests; initial

CAES scores were correlated with initial Dog Owner Satisfaction Survey scores. Spearman correlations were used as the data was not normally distributed (Field, 2009). A significant correlation between the total score of the CAES and the total score of the Dog Owner Satisfaction Survey would indicate that the former had adequate predictive validity.

4.3. Results

Initial survey data for the long-term dog owner sample was collected between March 2015 and August 2016; subsequent survey data (i.e. two week and three month retests) was collected between April 2015 and September 2016. The sample size of the first follow-up survey was n=143; the mean time between initial survey completion and the first follow-up survey completion was 78.0 days (range = 15 – 227 days). For the second follow-up survey the sample size was n=84, and the mean time between initial survey completion and second follow-up survey completion was 119.9 days (range = 88 – 260 days). Initial survey data for the dog relinquisher sample was collected between December 2014 and June 2015; subsequent survey data was collected between April 2015 and October 2015. The sample sizes of the follow-up surveys were determined to be too small to conduct any meaningful statistical analysis (i.e. n=12, n=4), so this data was not used further. Initial survey data was collected for the dog adopter sample between September 2014 and March 2016. Follow-up survey data was collected between April 2015 and January 2017. A total of 296 dog adopters who had adopted dogs from 11 different organisations agreed to participate; 103/296 (34.8%) who adopted their dogs from eight organisations actually completed and returned the questionnaires. However, one participant completed the questionnaires incorrectly, so the final sample size was n=102, which was 34.5% of those who initially agreed to

participate. 38/102 participants completed the follow-up survey, which was 37.3% of the total sample. However, two follow-up surveys were completed incorrectly, which means actual data was collected for 35.3% (36/102) of the total sample. The mean time between initial survey completion (n=102) and follow-up survey completion (n=36) was 218.7 days (~ nine months) with a range of 180 – 409 days.

4.3.1. Assessment of the reliability of the DOTS-R and the CAES

4.3.1.1. The DOTS-R

For these analyses, the sample of long-term dog owners (n=484) and dog relinquishers (n=590) was used. The first factor analysis for the DOTS-R using a direct oblimin rotation failed to replicate the measure's original structure (i.e. the number of factors as reported in Windle and Lerner [1986]). It was then hypothesised that perhaps the two populations (i.e. long-term dog owners and dog relinquishers) had very different experiences from each other causing differences in factor loadings between them. To test this possibility and differentiate it from simply an unstable structure, the two samples were pooled together, and then systematically divided into two evenly split groups (n=537). However, due to different numbers of incomplete surveys in the samples, the sample sizes analysed in the two groups were smaller and slightly unequal: group one: n=237; group two: n=208. A second exploratory factor analysis was conducted on these samples; the scree plot suggested a 7-factor model for each, so a confirmatory factor analysis was conducted accordingly. This analysis showed that only seven items loaded on the same factors for both groups. An exploratory factor analysis with a varimax rotation was conducted, which produced fewer matched factor loadings and so this method was rejected. Although it was unlikely that the items were not correlated, an orthogonal rotation was also used at this point to investigate whether it would

produce a greater number of matched factor loadings than an oblique rotation (Field, 2009); a varimax rotation was chosen as it is simple and widely used (Abdi, 2003). The exploratory analysis was therefore repeated with only the seven items that had matching loadings from the previously conducted confirmatory analysis with a direct oblimin rotation. Based on the Kaiser criterion one factor was extracted, and all seven items loaded onto it (Field, 2009). In the interest of pursuing multiple avenues of assessing the measure's structural integrity, and its specific relevance to the nature of this research, a separate exploratory analysis was performed with only the five items that comprise the dimension the authors named "Flexibility/Rigidity". All five items loaded onto one factor. The inconsistencies with the original findings were a concern and so one of the authors of the original measure was contacted via email (Windle, personal communication, August 10, 2015). The data was also reviewed to ensure there were no apparent scoring errors or faults when it was uploaded to SPSS from Qualtrics via Excel. The author recommended using a direct oblimin rotation, and he noted that the sample sizes should be fairly large (i.e. n=250-500). The sample sizes used were slightly smaller than the ideal threshold (i.e. n=237, n=238), but even so this did not seem to be reason enough to cause such difficulties in structural replication. It was ultimately decided that both the five items on the "Flexibility/Rigidity" dimension, which was now referred to ask the DOTS-R5, and the separate seven items with matched factor loadings, which was now referred to as the DOTS-R7, would be taken forward for further analyses and refinement (see Table 4.4).

Table 4.4

The two reliable scales of the DOTS-R

Seven-item model (DOTS-R7) (derived from analyses in this research)		**Flexibility/Rigidity Dimension (DOTS-R5)** (as determined by the measure's authors and confirmed in this research)	
Item number	Item	Item number	Item
5	Once I am involved in a task, nothing can distract me.	1	It takes me a long time to get used to a new thing in the home.
6	I persist at a task until it's finished.	13	It takes me a long time to adjust to new schedules.
9	I can always be distracted by something else, no matter what I may be doing.	18	It takes me a long time to adjust to new schedules.
15	If I am doing one thing, something else occurring won't get me to stop.	44	When things are out of place, it takes me a long time to get used to it.
20	Things going on around me cannot take me away from what I am doing.	49	I resist changes in routine.
22	Once I take something up, I stay with it.		
24	I am hard to distract.		

In order to further assess the reliability of the DOTS-R5 and the DOTS-R7, the data collected from the long-term dog owner sample was pooled with the data collected from the dog relinquisher sample. Additional responses that had been collected in the meantime while the analyses to this point were underway, were also included (n=1,175). The sample size of each population remained closely matched: long-term dog owners (n=554) and dog relinquishers (n=621). As was the case in the initial analyses, not all participants completed the entire survey, so the number of scores included in the analyses were approximately half of the total sample size. The scores were then summed for the DOTS-R5 and for the DOTS-R7. Scores were coded based on which sample they were from (i.e. long-term dog owners or dog relinquishers). Once these steps had been completed it was possible to compare the scores of each sample. An independent means t-test was conducted for each of the

DOTS-R scales. The item to total score bivariate correlations using a Pearson correlation coefficient were high and positively correlated for the items in both of the scales. These tests indicated that long-term dog owners were not scoring significantly higher than dog relinquishers (see Table 4.5). These findings suggested that neither the DOTS-R5 nor the DOTS-R7 were able to discriminate between the populations well (i.e. the scales were unable to mathematically separate based on population), and thus provided evidence that both were not useful tools to achieve the aim of this chapter, so they were not taken forward for any further analyses.

Table 4.5

DOTS-R7: t-tests and item to total score correlations

Item	t-values from t-test	Item to total score correlation: r-values (Pearson correlation coefficient)	Mean score for each population	
			Long-term dog owners	Dog relinquishers
5. Once I am involved in a task, nothing can distract me.	.669	.717	2.26	2.21
6. I persist at a task until it's finished.	.644	.706	2.78	2.74
9. I can always be distracted by something else, no matter what I may be doing.	-.869	.704	2.42	2.48
15. If I am doing one thing, something else occurring won't get me to stop.	.091	.703	2.16	2.15
20. Things going on around me cannot take me away from what I am doing.	1.129	.716	2.27	2.20
22. Once I take something up, I stay with it.	.293	.684	2.72	2.70
24. I am hard to distract.	-.461	.755	2.21	2.24

4.3.1.2. The CAES

For the factor analyses of the CAES, the process mirrored that for the DOTS-R. The scree plot from the first analysis using a direct oblimin rotation suggested a six or seven-dimension model, so a confirmatory analysis was conducted with seven forced factors. This analysis failed to replicate the structure of the original measure from which it was adapted. As with the DOTS-R, further

analyses were conducted with the pooled samples that were split into two groups (as previously described). Two subsequent confirmatory analyses were conducted forcing seven and 11 factors (the previous scree plot suggested that there were possibly 11 factors). The 11-factor model was slightly better than the seven-factor model, but still 31 of the 54 items either loaded on different factors between the groups or did not load on any factor at all. These 31 items were removed, and an exploratory analysis was performed on the remaining 23 items. Only six factors were extracted based on the Kaiser criterion. In this analysis, four items' loadings did not match. A confirmatory analysis was then done with six forced factors; 20 items' loadings matched. Thirty-four items were removed, and an exploratory analysis was performed with the remaining 20 items. In this analysis, only 13 items' loadings matched, so an exploratory analysis was performed with those items. Only three factors were extracted on the basis of the Kaiser criterion. All items' loadings matched, so it was finally determined that the measure should contain 13 reliable items comprising of three factors. Based on the criteria of the items that make up each factor, they were named: *Maintenance routine*, *Adaptability*, and *Sleep patterns* (see Table 4.6). Factors 1 and 2, *Maintenance routine* and *Adaptability*, each contained five items, and Factor 3, *Sleep patterns*, contained three items.

Table 4.6

CAES: 13-item, 3-factor model

Factor 1: Maintenance routine	Factor 2: Adaptability	Factor 3: Sleep patterns
I expect a dog to usually eat the same amount each day if fed their usual food.	I expect a dog to take a long time to adjust to changes in his/her schedule or to other individuals' schedules.	I expect a dog to change his/her position during sleep.
I expect a dog to get sleepy just about the same time every night.	I expect a dog to initially avoid something new or unfamiliar to him/her.	I expect a dog will change his/her position in bed a lot.
I expect a dog will usually eat about the same amount at meals.	I expect that changes in routine or environment will make a dog stressed.	I expect a dog to not move around much at all in his/her sleep.
I expect a dog to eat about the same amount at meals each day.	I expect it will take a dog a long time for him/her to get used to things being moved to new locations around the home.	
I expect a dog's appetite to stay the same day after day.	I expect the number of times a dog has to relieve him/herself on any day will vary from day to day.	

In order to further refine the measure, the same procedure and analyses were undertaken as were with the DOTS-R5 and DOTS-R7. Data from the long-term dog owner sample was pooled with the data from the dog relinquisher sample, and responses collected in the meantime were added (long-term dog owners: n=554, dog relinquishers: n=621). Scores for the 13-item CAES were summed. Scores were coded based on which sample they were from (i.e. long-term dog owners or dog relinquishers). Item to total factor score bivariate correlations were conducted using a Spearman correlation coefficient, as the scores were not normally distributed. Independent means t-tests were carried out for the CAES to compare group means. Group means were higher for long-term dog owners than for dog relinquishers for all but two of the items (see Table 4.7). Mann-Whitney tests were then used to compare scores for individual items between the two samples, as these were not normally distributed unlike the total score; six of the 13 items were significantly different. These six items were distributed among the three previously identified factors, although notably, four of the items were those that comprised the

Adaptability factor. Those four items also had the largest effects (i.e. p-values of <.001-.035 [see Table 4.7]). Long-term dog owners scored higher than dog relinquishers on all of the six items. As the remaining seven items were unable to mathematically distinguish between the two populations (i.e. long-owners did not score statistically differently from dog relinquishers on them), they were not taken forward for further analysis. These seven items comprised all of the *Maintenance routine* and *Sleep patterns* factors except for items 32 and 33, and the final item not taken forward was number 49 on the *Adaptability* factor. The six items that were taken forward were collectively referred to as the *6-item CAES* (i.e. those noted as having significant p-values in Table 4.7, which are discussed in greater detail in the following subsection).

Table 4.7

13-item CAES: p-values

Factor	Item	Mann-Whitney: sum of ranks		Mann-Whitney: mean ranks		Mann-Whitney: p-values (2-tailed)	Item to total factor score correlation (Spearman)	Mann-Whitney without #47 & 49: p-values	Item to total factor score correlation without #47 & 49	SD	Medians			Independent means t-tests: group means	
		Long-term dog owners	Dog relinquishers	Long-term dog owners	Dog relinquishers						Total	Long-term dog owners	Dog relinquishers	Long-term dog owners	Dog relinquishers
1: Maintenance routine	31. I expect a dog to usually eat the same amount each day if fed their usual food.	100471.00	100190.00	328.34	306.39	.095	.789	-	.821		3.00	3.00	3.00	3.14	3.03
	33. I expect a dog to get sleepy just about the same time every night.	102597.00	101883.00	334.19	306.88	.038*	.673	-	.713	0.74	3.00	3.00	3.00	3.07	2.94
	37. I expect a dog will usually eat about the same amount at meals.	100590.00	104530.00	327.65	313.90	.293	.828	-	.852		3.00	3.00	3.00	3.09	3.02
	43. I expect a dog to eat about the same amount at meals each day.	102185.00	102295.00	332.85	308.12	.056	.812	-	.830		3.00	3.00	3.00	3.09	2.98
	47. I expect a dog's appetite to stay the same day after day.	97916.00	105287.00	319.99	318.09	.889	.770	-	-		3.00	3.00	3.00	2.63	2.62
	Mann-Whitney: sum of ranks – factor totals	98501.00	96499.00	322.95	302.50	.153	-	.035	-		-	-	-	-	-

Factor	Item	Mann-Whitney: sum of ranks		Mann-Whitney: mean ranks		Mann-Whitney: p-values (2-tailed)	Item to total factor score correlation (Spearman)	Mann-Whitney without #47 & 49: p-values	Item to total factor score correlation without #47 & 49	SD	Medians			Independent means t-tests: group means	
		Long-term dog owners	Dog relinquishers	Long-term dog owners	Dog relinquishers						Total	Long-term dog owners	Dog relinquishers	Long-term dog owners	Dog relinquishers
2: Adaptability	13. I expect a dog to take a long time to adjust to changes in his/her schedule or to other individuals' schedules.[1]	107110.00	99293.00	347.76	297.28	<.001*	.783	-	.791	0.83	2.00	3.00	2.00	2.49	2.26
	17. I expect a dog to initially avoid something new or unfamiliar to him/her.[1]	102972.50	102147.50	335.42	306.75	.035*	.637	-	.683	0.80	3.00	3.00	3.00	2.63	2.48
	18. I expect that changes in routine or environment will make a dog stressed.[1]	107373.50	97746.50	350.89	292.65	<.001*	.681	-	.704	0.68	2.00	2.00	2.00	1.92	1.68
	44. I expect it will take a dog a long time for him/her to get used to things being moved to new locations around the home.[1]	103786.50	99416.50	339.17	300.35	.004*	.713	-	.720	0.78	3.00	3.00	3.00	2.79	2.62
	49. I expect a dog to not easily adapt to changes in routine.[1]	102566.50	102553.50	334.09	307.73	.055	.706	-	-		3.00	3.00	3.00	2.60	2.49
	Mann-Whitney: sum of ranks – factor totals	104491.00	92387.00	344.85	285.15	.000	-	.000	-		-	-	-	-	-

Factor	Item	Mann-Whitney: sum of ranks		Mann-Whitney: mean ranks		Mann-Whitney: p-values (2-tailed)	Item to total factor score correlation (Spearman)	Mann-Whitney without #47 & 49: p-values	Item to total factor score correlation without #47 & 49	SD	Medians			Independent means t-tests: group means	
		Long-term dog owners	Dog relinquishers	Long-term dog owners	Dog relinquishers						Total	Long-term dog owners	Dog relinquishers	Long-term dog owners	Dog relinquishers
3: Sleep patterns	32. I expect a dog to change his/her position during sleep.	101674.50	102166.50	332.27	307.73	.042*	.735	-	-	0.59	4.00	4.00	4.00	3.65	3.58
	38. I expect a dog will change his/her position in bed a lot.	97769.50	106071.50	318.47	320.46	.882	.848	-	-		3.00	3.00	3.00	1.88	1.88
	46. I expect a dog to not move around much at all in his/her sleep.[1]	97481.50	107638.50	317.53	323.24	.667	.813	-	-		3.00	3.00	3.00	3.25	3.26
	Mann-Whitney: sum of ranks – factor totals	98165.50	102495.50	320.80	313.44	.606	-	-	-		-	-	-	-	-
Total						.000				2.47					

*Indicates significant p-values; these six items statistically distinguished between the samples

[1] Indicates reverse scored items

4.3.2. Assessment of whether long-term dog owners are significantly more behaviourally flexible than dog relinquishers

Using the 6-item CAES, the mean summed scores for each sample (long-term dog owners: n=554, dog relinquishers: n=621) were evaluated to determine a cut-off point in scores between the samples. Those who had a total score on the CAES of <16 were significantly more likely to have relinquished a dog at some point in the past (i.e. they are part of the dog relinquisher sample). Those who had a total score of ≥16 were significantly more likely to have owned their dog for ≥3 years (i.e. they are part of the long-term dog owner sample).

As previously mentioned, four of the six items on the CAES that were able to mathematically distinguish between the two samples comprised the *Adaptability* factor, and these items had the greatest effect size. Those items were:

- *I expect a dog to take a long time to adjust to changes in his/her schedule or to changes in other individuals' schedules,*
- *I expect a dog to initially avoid something new or unfamiliar to him/her,*
- *I expect that changes in routine or environment will make a dog stressed,* and
- *I expect it will take a dog a long time for him/her to get used to new things being moved to new locations around the home.*

The other two items were:

- *I expect a dog to get sleepy just about the same time every night,* and
- *I expect a dog to change his/her position during sleep.*

These two items were on the *Maintenance routine* and *Sleep patterns* factors, respectively. As each item of the measure was rated by participants on a 1-4 Likert-style scale, the higher an item was rated the more indicative of a participant's

greater level of agreement with the item. Therefore, a higher total score for the measure indicated that they expected the behaviours of a dog described in each item, which was the case for the long-term dog owner sample. Because they expected such behaviours, it be can be hypothesised that they might be more willing to accommodate a dog when they displayed such behaviours, which is suggestive of a greater level of behavioural flexibility. Specifically, this indicates a greater level of flexibility in long-term dog owners' expectations of dog behaviour than in dog relinquishers' expectations of dog behaviour, particularly those behaviours that pertain to a dog's ability to adapt. In other words, the fact that long-term dog owners had a higher total score than dog relinquishers on the CAES is evidence that long-term dog owners may be more behaviourally flexible than dog relinquishers.

4.3.3. Assessment of the long-term stability of the CAES

Using the subset of the long-term dog owner sample that completed the CAES three times (n=38), all three correlations between initial CAES item scores and retests were significant. Two correlations (i.e. initial CAES versus 1st retest and 1st retest versus 2nd retest) had correlation coefficients that indicated a large effect size (i.e. r=>.5). The third correlation (i.e. initial CAES vs. 2nd retest) had a slightly smaller, though similar, correlation coefficient (see Table 4.8). Based on these significant p-values and effect sizes, the CAES was determined to have good long-term stability.

Table 4.8

Correlations between CAES initial item scores and retest item scores (n=38)

	Initial survey	1st retest	2nd retest
Initial survey	-	p = .001 r = .54	p = .004 r = .46
1st retest	p = .001 r = .54	-	p < .001 r = .66
2nd retest	p = .004 r = .46	p < .001 r = .66	-

4.3.4. Assessment of whether the CAES has adequate predictive validity in order to predict which dog placements have long-term success

Using the subset of the long-term dog owner sample that completed the Dog Owner Satisfaction Survey three times (n=38), all three correlations between initial survey item scores and retests were significant (see Table 4.9). The correlation coefficients for the three correlations also all had large effect sizes (i.e. r=>.5). Based on these significant p-values and effect sizes, the Dog Owner Satisfaction Survey was determined to have good long-term stability.

Table 4.9

Correlations between Dog Owner Satisfaction Survey initial item scores and retest item scores (n=38)

	Initial survey	1st retest	2nd retest
Initial survey	-	p < .001 r = .59	p = .001 r = .50
1st retest	p < .001 r = .59	-	p < .001 r = .58
2nd retest	p = .001 r = .50	p < .001 r = .58	-

In both the long-term dog owner sample and the dog adopter sample the correlations between CAES total scores and Dog Owner Satisfaction Survey total scores were not significant (see Table 4.10). The lack of significance in the long-term dog owner sample indicated that CAES scores were not suggestive of dog owners' level of satisfaction with their relationship with their dog.

Table 4.10

Correlations between CAES total scores and Dog Owner Satisfaction Survey total scores in the long-term dog owner sample and in the dog adopter sample

	CAES total scores: long-term dog owner sample (n=36)	CAES total scores: dog adopter sample (n=33)
Dog Owner Satisfaction Survey total scores: long-term dog owner sample (n=36)	p = .169 r = .234	-
Dog Owner Satisfaction Survey total scores: dog adopter sample (n=33)	-	p = .193 r = -.232

4.4. Discussion

The adaptation process of three of the measures in this chapter (i.e. the DOTS-R, the CAES, and the DPES) was a prolonged process but ensured a degree of rigour rarely seen in this field in test development. The first stage of the iterative adaptation process to assess the measures' face validity took two months as completion of the stage was reliant on receiving the panel's multiple rounds of responses. The considerable amount of time required to employ a Delphi method has been noted as a drawback to the method in other studies (e.g. De Villiers, De Villiers, & Kent, 2005).

It was surprising that the factor structure of the DOTS-R, which was unadapted and used in its original format, could not be replicated. This measure was developed over three decades ago and has been widely cited and used in academic research in the years since (e.g. Essau, Conradt, & Petermann, 1999; Gumora & Aresenio, 2002; Vitaro, Brendgen, & Tremblay, 2002). The wording and structure of the items and the scoring system were reported by the panel to assess comprehensibility as being confusing, so this may have affected the reliability of the measure, even though it was administered in its original format. It may be that differences in language and phraseology have occurred over time, thus affecting the measure's comprehensibility and reliability. Similarly, in the current study the participants in

the long-term dog owner and dog relinquisher samples resided in several countries, so it is possible that culture and regional language differences affected survey outcome. It is also a possibility that completing the measure in an electronic format (i.e. via the online survey platform) affected its reliability, given that the measure was created at a time prior to the administration of surveys by this means. Future research that seeks to use the DOTS-R should conduct preliminary analyses with adequate sample sizes, as noted by Windle (personal communication, August 10, 2015), to investigate whether factors such as testing means and culture are associated with survey outcome.

It was also somewhat surprising that only six of the 54 items in the adapted CAES were found to be reliable. The reliability of the original version of the measure from which the CAES was adapted, the DOTS-R Child Expectations, was not assessed because the measures had been widely cited and used in other studies. However, it is possible that despite this, the original version of the measure had poor reliability, which may be why only six items of the survey's 54 items were found to be reliable. It is also possible that the measure is not well suited to be adapted to the dog-owner relationship. It is worth noting that four of the six reliable items comprise the *Adaptability* factor, which has parallels with one of the major themes reported by Shore (2005) in dog relinquishers' reactions to their failed adoption experience. This theme focused on a recognition by relinquishers that it is difficult to predict how an adoption will turn out; a dog's behaviour may change from the shelter setting to the home environment as they are adjusting to the environment, so it is difficult to make predictions pre-adoption (Shore, 2005).

While the six-item CAES had good long-term stability, the correlations between the dog adopter sample's initial CAES scores and follow-up Dog Owner

Satisfaction Survey scores were not significant. One possible explanation is that the Long Term Dog Owner Satisfaction Survey is not reliable. Reliability analysis was not part of the current research, although it was developed for the purposes of this study, due to issues with sample size. Future research should evaluate its reliability using a considerably larger long-term dog owner sample than was used in the current study (i.e. n=36). However, there are other possibilities to consider as well, such as dog owner satisfaction not being a useful metric to assess the success of the placement; many owners may persist with a dog even when the relationship is problematic, due to their emotional bond (e.g. Handlin, Nilsson, Ejdebäck, Hydbring-Sandberg, & Uvnäs-Moberg, 2012; Payne, Bennett, & McGreevy, 2015; Prato Previde et al., 2003). This hypothesis concerning the value of owner satisfaction deserves further investigation. In order to assess the predictive validity of the CAES, future research should consider other metrics for qualifying a successful placement, such as family attitudes to rehoming and their relationship with the dog or simply whether or not the dog remains in the home (rather than being relinquished or rehomed elsewhere).

The current study had good sample sizes of both long-term dog owners and dog relinquishers (i.e. n=~500 for each sample). This is probably the consequence of recruiting participants anonymously online, rather than in person, as was originally planned. When the decision was made to recruit online, the qualifying criteria of a dog relinquisher was widened to include anybody who had ever recruited a dog at any point in the past, as opposed to those who were currently surrendering their dog. While other studies have interviewed owners who are surrendering their dog or asked them to complete questionnaires (e.g. DiGiacomo et al., 1998; Shore, 2005), it is possible that the anonymity of the online survey

administration contributed to not only the large sample size, but also to the honesty of the information they provided. Although recruitment for these two samples was very successful, there may have been a bias within the samples, such as toward long-term dog owners who had a positive relationship with their dog, and dog relinquishers who were comfortable discussing their experience of surrendering a dog. Similarly, although dog adopters were recruited in person, rather than online, that sample may have been biased as well, such as by those adopters who were happier with their newly adopted dog; the fact that only approximately one third of adopters who initially agreed to participate actually completed the surveys may be evidence of this.

What is probably the most noteworthy result of the current study are the differences found between the dog relinquisher population and the long-term dog owner population. While many studies have both qualitatively and quantitatively assessed aspects of dog relinquisher populations (e.g. DiGiacomo et al., 1998; New et al., 2000; Patronek et al., 1996; Salman et al., 1998), there do not appear to be any studies that have investigated potential differences between these populations. This is surprising considering that it is ultimately the dog owner who decides to terminate the relationship and relinquish the dog, so it would seem a worthy focus of research to investigate if there are underlying or fundamental differences between the two populations, which leads one to relinquish their dog and another to keep their dog. As discussed in Chapter 2, several characteristics of surrendering owners are established risk factors for relinquishment (Diesel et al., 2008; New et al., 2000; Patronek et al., 1996). This is certainly useful information, but such factors are still only descriptive (e.g. owners <25 years old); they do not give much insight into

what might set apart somebody who relinquishes a dog from somebody who does not.

Four of the six reliable items of the CAES were on the *Adaptability* factor; long-term dog owners were more likely to agree with each of these items than dog relinquishers were:

- I expect a dog to take a long time to adjust to changes in his/her schedule or to other individuals' schedules.
- I expect a dog to initially avoid something new or unfamiliar to him/her.
- I expect that changes in routine or environment will make a dog stressed.
- I expect it will take a dog a long time for him/her to get used to things being moved to new locations around the home.

The other two items were on the *Maintenance routine* (I expect a dog to get sleepy just about the same time every night.) and *Sleep patterns* (I expect a dog to change his/her position during sleep.) factors. For these two items, long-term dog owners were more likely to agree with them than dog relinquishers were. The fact that four of the items were on the *Adaptability* factor, and those had the largest effect sizes, is worthy of further note. The results support the suggestion that long-term dog owners are more flexible than dog relinquishers in their expectations of a dog's level of adaptability, and this may be a key attribute for shelters to take note of, if they are seeking suitable owners, or seeking to help develop suitable long-term partnerships. Being adopted and moving into a new environment is undoubtedly a big change for a dog, which requires some getting used to. If an adopter is aware of this, and is flexible in their expectations of how this process will go as the dog is adapting to the environment, then it might be easier for them to cope than for an adopter who does not anticipate that this might be a challenging period of adjustment. Dogs are

reported to be at the greatest risk for relinquishment in the first three months after they have been acquired (OR, 18.2; 95% CI: 12.3-27.0) (New et al., 2000). This period is when they are likely doing the most adjusting to their new environment and when owners are probably most getting used to having a new dog, so given the findings of the current study, it is unsurprising that this is when a dog has the greatest odds of being relinquished. While the other two CAES items were on separate factors, they both pertained to sleep. Diesel et al. (2008) reported that dogs who slept in a family member's bed were at a decreased risk for relinquishment, which may be a proxy for a greater dog-owner bond, but there may also be something unique about an understanding of a dog's sleep habits that differentiates long-term owners from relinquishers. It may be that a poor understanding of a dog's sleep habits could affect an owner's sleep routine or quality, which could become intolerable and cause a breakdown in the relationship. The fact that long-term dog owners were more likely to expect that a dog will get sleepy at around the same time every night may suggest that they are aware of a dog's routine or intend to create such a routine, and may extend this routine to other aspects of daily life with the dog (e.g. walks and meals at the same time everyday). By doing so, it is possible that they are providing the dog with greater predictability in their environment and potentially reducing the risk of unfavourable behaviours (e.g. inappropriate elimination) developing, many of which are reported risk factors for relinquishment (Diesel et al., 2008; New et al., 2000; Patronek et al., 1996). Long-term dog owners were more likely to expect a dog to change position during sleep. It may be that long-term dog owners allow their dog to sleep in the bed with them knowing that they may unexpectedly move as they sleep, whereas dog relinquishers who allow their dogs to sleep in bed with them do not expect unexpected movement and find it

disruptive, and thus no longer allow the dog to sleep in bed with them. Moreover, as a dog is adjusting to their new environment, it is plausible that their sleep patterns or habits may be erratic, so perhaps relinquishers do not expect this and are unable to cope with it.

There were an additional seven items on the CAES that were reliable but there was not a significant difference in scores between the two samples (see Table 4.7). Four of these items were on the *Maintenance routine* factor, and they all pertained to eating and appetite (e.g. I expect a dog to usually eat the same amount each day if fed their usual food.). Because none of the items that were significantly different pertained to food, it may be that eating and appetite are not a great cause for concern for an owner, and thus do not affect the dog-owner relationship; there are no reported risk factors for relinquishment in the literature that pertain to eating or appetite. The means of these four items were all greater for long-term dog owners and for dog relinquishers (3.14, 3.03; 3.09, 3.02; 3.09, 2.98; 2.63, 2.62), so long-term dog owners were more likely, though not significantly so, to expect that a dog will eat about the same amount from meal to meal and from day to day. Two items were on the *Sleep patterns* factor, and they were very similar in nature to the item in this factor that was significantly different between the two populations (e.g. I expect a dog will change his/her position in bed a lot.). For one item the means for long-term dog owners and dog relinquishers were exactly the same (1.88), and for the other item the mean was greater for dog relinquishers than for long-term dog owners (3.26, 3.25), so for the latter item dog relinquishers are more likely, though not significantly so, to expect a dog to not move around much at all in his/her sleep. Due to the opposite nature of the item's wording, this result is actually still in line with the item on this factor in which the samples did significantly differ (i.e. long-

term dog owners were more likely to expect a dog to change his/her position during sleep). It is possible that the two samples did not differ on these items due to their wording; perhaps the exact wording of the item on which the samples did differ was the easiest to understand of the three items. The final item was on the *Adaptability* factor (I expect a dog to not easily adapt to changes in routine.). The mean for long-term dog owners was greater than for dog relinquishers, (3.65, 3.58), so long-term dog owners were more likely to expect a dog to not easily adapt to changes in routine. Perhaps this item was slightly vague in its wording, which may be why the samples did not differ significantly on it. The item does not specify changes in whose routine, so it may be that some participants believed it was the dog's routine and others believed it was the owner's routine, and this could have caused some confusion.

Conclusion

The findings of this chapter indicate that there are potentially important differences in the expectations of long-term dog owners and dog relinquishers, which may relate to their status. Given the reliable items of the CAES identified here, these related largely to expectations of behavioural flexibility but also sleep in the dog. Though additional research is needed, at this point behavioural flexibility in the dog appears to be an important factor to consider for a successful dog-owner relationship.

Chapter 5

Behavioural flexibility has been widely studied in a number of species, including dogs. However, it has not yet been considered in dogs in the context of rehoming, although it may be key to the success of the placement. Therefore, the aim of this chapter is to determine whether dogs who have remained in homes long-term show evidence of greater flexibility than dogs in shelters. Several tests have been used to assess behavioural flexibility in dogs in the literature, but they may not be ideally suited for usage in a rehoming context to assess practically what a flexible dog looks in a domestic environment. A battery of four tests was created to theoretically assess six factors hypothesised to comprise behavioural flexibility in dogs: the L-shaped food finding test, the Time alone test, the Three-toy test, and the Pointing test. Two populations of dogs were tested (i.e. shelter dogs and long-term owned dogs) using two testing means (i.e. by the principal investigator and by a citizen science approach), resulting in four samples. Chi-square tests were used to investigate whether two potential confounds, dog weight and testing means, were associated with test outcomes. A series of DFAs were then conducted on test items not affected by dog weight or testing means, for the purpose of investigating whether the items could statistically distinguish between the two populations and successfully classify dogs into the correct population; only items able to do this were taken forward. A final series of DFAs were conducted to investigate whether they could be used together to classify dogs into the correct population. Both dog weight and testing means were confounds in the Three-toy test, and in several items within the Time alone test and the Pointing test. Neither affected any items in the L-shaped food finding test. Two items in the L-shaped food finding test, one item in

the Time alone test, and one item in the Pointing test were able to classify dogs into the correct population. The item from the Pointing test was removed due to its very small sample size. Of the remaining three items, only the two from the L-shaped food finding test were able to correctly classify dogs. After a final DFA was performed to attempt to classify the origins of the long-term owned dog population, it was determined that for the purposes of the current study, that all tests were unreliable. Consequently, dogs who had remained in homes could not be compared with shelter dogs. However, the results do raise important considerations for dog assessments generally. The role of dog weight has not been considered as a potential confound in dog assessments, whereas it may be that dogs of different weights (i.e. sizes) are fundamentally experiencing the world differently, and thus the same testing protocol may not be appropriate for all dogs. Similarly, it should not be necessarily assumed that data collected via a citizen science approach can be combined with that collected via trained investigators.

5.1. Introduction

In the previous chapter, attention was given to the assessment of the potential owner side of the adoption process; however, a considerable amount of the research on dog rehoming focuses on both the development of tests to assess dogs pre-adoption (e.g. De Palma et al., 2005; Lucidi, Bernabo, Panunzi, Dalla Villa, & Mattioli, 2005), and on evaluating the reliability and validity of tests that are already in existence. This includes those that are widely used and those that are developed in-house by organisations (e.g. Bennett et al., 2012; Chapter 1; Mornement et al., 2010; Taylor & Mills, 2006), but as noted in Chapter 3 most tests in use seem to have little rationale or validation in practice. Chapter 1 also highlighted that there are currently no tools for assessing behavioural flexibility in dogs in the context of

dog rehoming, even though this is likely to be an important factor in building a successful relationship between dog and owner.

Behavioural flexibility is a widely studied concept in non-human animals; it broadly refers to an ability to adapt to a changing environment and the changing demands within that environment, and mammals show evidence that they are particularly adept at this (Hamilton & Brigman, 2015; Kolb, 1990; McFarland, Barrett, Boner, Freeman, & Henzi, 2014; Ragozzino et al., 1999). As previously discussed in Chapter 1, there are various physical and social demands present within a dog's domestic environment (i.e. a home), and this thesis hypothesises that the ability of a dog to effectively "fit in" is determined by its ability to cope with these. A dog that is not able to "fit in" to their domestic environment may result in the dog-owner relationship being terminated and the dog being relinquished.

Behavioural flexibility is a multi-faceted concept encompassing several aspects (e.g. inhibitory control, strategy shifting, innovation rates). As such, in order to assess behavioural flexibility in other species, and the degree to which animals' behavioural responses adapt as they attend to changing external cues in their environments, a number of types of tests have been used. Behavioural flexibility, including their degree of perseverance, has been assessed in rats using a rotating-arena based apparatus (i.e. "the carousel paradigm") (Svoboda, Stankova, Entlerova, & Stuchlik, 2015), using maze-type tests (Floresco, Ghods-Sharifi, Vexelman, & Magyar, 2006; Ragozzino et al., 1999), as well using operant conditioning chambers (Brady & Floresco, 2015; Haluk & Floresco, 2009; Kleen et al., 2013). It has been assessed in birds using a serial reversal-learning test (Bond, Kamil, & Balda, 2007). In lemurs behavioural flexibility has been assessed using an artificial feeding task with feeding boxes (Huebner & Fichtel, 2015). It has been

examined in primates using a battery of inhibition tasks (e.g. delay-of-gratification tests) (Amici, Aurelli, & Call, 2008). These tests as well as others have also been used with dogs to assess aspects of behavioural flexibility. In the context of how vervet monkeys adapt to climate changes in their environment, behavioural flexibility has been investigated in a more natural setting (rather than in a laboratory), by tracking the amount of time spent engaging in normal behavioural patterns (e.g. resting, feeding) during mating and non-mating seasons, and how/if ambient temperature affected time spent performing these behaviours (McFarland et al., 2014). It is often examined in dogs in the context of the effects of ageing on flexibility (e.g. Chan et al., 2002; Wallis et al., 2016). Dogs' capacity for inhibitory control in various decision-making contexts, an aspect of behavioural flexibility, has been assessed using a battery of three tests ("the social task", "A-not-B task", "the cylinder task") (Bray, MacLean, & Hare, 2014). Reversal-learning tests have also been used to assess aspects of behavioural flexibility and cognitive inhibition in dogs (Brucks, Marshall-Pescini, Wallis, Huber, & Range, 2017). The "unsolvable task paradigm" has been used to assess dogs' problem solving abilities (e.g. perseverance), an aspect of behavioural flexibility (Passalacqua, Marshall-Pescini, Merola, Palestrini, & Prato Previde, 2013).

However, it seems in general that behavioural flexibility in dogs has not received as much research attention as it has in other non-human species. Moreover, the role of behavioural flexibility in dogs in the context of shelter dogs and rehoming has not yet been explored. Therefore, the aim of the current chapter is to determine whether dogs who have remained in homes long-term show evidence of greater flexibility than dogs in animal shelters; there are eight objectives associated with this aim:

1. to create and pilot a battery of game-like tests to theoretically assess behavioural flexibility in dogs, in order to develop a potentially feasible instrument for this purpose to be used in a shelter setting,
2. to prepare the testing battery to be administered using a citizen science approach by: creating detailed instructions for testing set-up and administration, assessing the feasibility and comprehensibility of both, and creating a testing questionnaire for participants to complete, in order to be able to gather information from diverse sources with a view to assessing reliability in general use,
3. to administer the testing battery to a sample of shelter dogs using a citizen science approach (i.e. shelter, rescue centre, rehoming organisation staff/volunteers assess their dogs needing to be rehomed), in order to gather information from the experimental group,
4. to administer the testing battery to a sample of long-term owned dogs (i.e. have been in their current home for >1 year) using a citizen science approach (i.e. dog owners assess their own dogs at home), to provide a comparator population,
5. to personally administer the testing battery to a sample of shelter dogs, in order to allow comparison against the gold standard procedure with a view to assessing reliability,
6. to personally re-administer the testing battery to a subset of the sample of shelter dogs (from objective 5) one month after the initial testing administration, for the purpose of assessing the long-term stability of the tests,

7. to personally administer the testing battery to a sample of long-term owned dogs for the same purpose within the comparison population, and
8. to assess in what ways shelter dogs differ from those who have remained in a home long-term based on the testing battery in order to determine how the two populations may vary in terms of behavioural flexibility.

Because the aim of this chapter encompasses both the development of tests and the administration of them to multiple samples to ultimately achieve the final objective, several objectives were necessary to do this. The purpose of the first two was test development, which was necessary to be done prior to administration; the inclusion of the second objective may be unique to the current study compared to other studies in which dog behaviour tests are developed, as including a citizen science approach might not be typical. The third and fourth objectives were included as separate objectives, as the usage of a citizen science approach for assessing the populations may yield different outcomes from those assessed by a trained investigator, so it was key to clearly differentiate the two means of administration at this point. Citizen science has grown in popularity in recent years across many fields of study (e.g. ecology, biology, technology), but its historical roots go back centuries (Kobori et al., 2016; Miller-Rushing, Primack, & Bonney, 2012; Silvertown, 2009). A citizen scientist is defined as, "*a volunteer who collects and/or processes data as part of a scientific enquiry*" (Silvertown, 2009). More recently citizen science methods have been successfully used in the field of canine cognition research with dog owners and their dogs (Hecht & Rice, 2015; Horowitz & Hecht, 2014; Stewart et al., 2015). This method of collecting data is a useful means to collect large quantities of data, often while educating the participants on what they are studying (e.g. a particular organism) and allowing them to become

part of the scientific process (e.g. Bonney et al., 2009; Cohn, 2008; Newman et al., 2012). Because citizen science has become an accepted method of collecting data in research and potentially allows for a greater amount of data collected than may otherwise be possible using traditional methods, and because dog owners are often enthusiastic about learning about and working with their dogs, it was decided that including a citizen science dimension in this study would also be useful. Similarly, because animal shelter staff and volunteers may also have been willing to contribute to research that pertains to dog rehoming, a citizen science component was included in the shelter dog sample. Additionally, because one of the overarching aims of this thesis was the ultimate development of a practical application to improve rehoming efficiency and success, it was theorised that by asking organisations and dog owners to test their own dogs, it would further address the feasibility of administration in a real world setting.

The fifth, sixth, and seventh objectives pertained to test administration by the principal investigator. Although they were assessing the same populations as those tested by a citizen science approach, they were included as separate objectives for the previously described reason (i.e. testing by different means may yield different outcomes). Additionally, the sixth objective was included in order to assess the long-term stability of the tests, which would also serve to investigate their predictive qualities (i.e. are dogs performing the same way at different points in time), as was done with the human measures in Chapter 4. The final objective ultimately achieves the aim of the chapter through statistical analysis, which would provide evidence of whether or not dogs who have remained in homes long-term show greater flexibility than dogs in shelters.

5.1.1. The theoretical basis behind the development of a tool to assess behavioural flexibility in dogs

Before beginning to develop a tool to assess behavioural flexibility in dogs, it was first necessary to consider how a behaviourally flexible dog would be recognised in practice, and what an ideal dog looks like in the home, taking into consideration common reasons for relinquishment reported in the literature (e.g. Chapter 1; Marston et al., 2005; Salman et al., 1998; Scarlett et al., 1999). As previously described in section 5.1, a range of tests have been used in other studies to assess aspects of behavioural flexibility in dogs. However, they may not be ideally suited for usage in a rehoming context to assess practically what a flexible dog looks in a domestic environment. As such, for the purposes of the current study, in order to develop a battery of tests, six factors were hypothesised to comprise behavioural flexibility in dogs:

1. the ability to occupy oneself, which demonstrates flexibility in using the environment,
2. the ability to problem solve, which involves flexibility in selecting from different strategies,
3. distractibility / ability to focus attention / ability to break attention, which demonstrates flexibility in perseverance and focus,
4. consistency of responses / ability to generalise responses, which involves flexibility in learning,
5. social attention (toward owner or family), which demonstrates flexibility in building relationships, and
6. social skills (i.e. appropriate responsiveness in an environment or circumstances), which demonstrates flexibility in responsiveness by using cues from the environment.

The ways in which each factor could be assessed and measured were brainstormed between the principal investigator and thesis supervisors, while keeping in mind methods of assessment reported in other studies that may have been useful for the purposes here, such as "pointing tests" (e.g. Hare & Tomasello, 2005), "yawning contagion tests" (e.g. Joly-Mascheroni, Senju, & Shepherd, 2008), and "Strange Situation tests" (e.g. Gásci, Topál, Miklósi, Dóka, & Csányi, 2001; Prato Previde et al., 2003). "Pointing tests" may have been useful as they could theoretically assess factors such as a dog's level of distractibility / ability to focus attention and social attention toward a person. "Yawning contagion tests" may have been useful as they could theoretically assess a dog's level of social attention toward a person. Although they have been adapted for usage with dogs to investigate attachment between dog and owner, "Strange Situation tests" may have been useful to assess behavioural flexibility by assessing a dog's ability to occupy themselves or their social skills in a particular environment, with anxiety often being associated with reduced flexibility and the development of behavioural perseveration (e.g. Park & Moghaddam, 2017; Steimer, 2011; Wallace et al., 2016). While such types of tests may not have previously been used in other studies for assessing behavioural flexibility, because it is a complex construct encompassing many aspects, such might be useful and provide insight into particular aspects via a novel assessment means.

The list of scenarios was then narrowed by considering the feasibility and logistics of testing them, while not losing the range of attributes desired. Three primary factors were taken into consideration when determining what tests or types of tests may be useful for theoretically assessing aspects of behavioural flexibility in the context of dog rehoming:

1. what does a flexible dog look like in practice, i.e. what specific elements of a home environment, or experiences within that environment, might a dog encounter (e.g. a human's pointing gestures, being left alone with humans coming and going),
2. in what ways have aspects of behavioural flexibility been assessed in animal species in the literature, and
3. due to the citizen science component, how could aspects of behavioural flexibility feasibly be assessed by untrained testers and using items commonly found in home or shelter environments (e.g. chairs and large towels).

The third factor was of particular importance due to the study design; tests that had been used in studies of behavioural flexibility in any species were not considered if they required specialised equipment or very particular testing spaces or environments. Taking into consideration such exclusionary criteria and the above three factors, this resulted in the creation of a battery of four tests to assess the six factors listed above; the testing battery serves as a tool to theoretically assess behavioural flexibility in a dog rehoming context. Each test was designed to assess more than one factor and each factor was assessed by more than one test (see Table 5.1). The four tests are: *the L-shaped food finding test*, *the Time alone test*, *the Three-toy test*, and *the Pointing test*.

5.1.2. The tests comprising a tool to assess behavioural flexibility in dogs in a rehoming context

The L-shaped food finding test: This test is an adaption of a "detour task"; it is hypothesised that a dog must show behavioural flexibility to take the detour rather than the direct route to access the food. Detour-type tests have been used in studies of behavioural flexibility in several species, such as sparrows (Boogert, Anderson,

Peters, Searcy, & Nowicki, 2011), primates (Amici et al., 2008), and mice (Juszczak & Miller, 2016). The test is set up in an empty corner of a room (see Figure 5.1 for a diagram of the testing area and Figure 5.2 for an image of the testing area). Four chairs (e.g. dining room chairs) are used to create the borders of the testing area (A); two of the chairs are placed in a right angle opposite the corner of the room, and the other two chairs are placed perpendicular to the walls (B). Two spaces (approximately 45 cm wide) are left between the chairs forming the right angle with the other two chairs; the chairs forming a right angle are touching to form a corner. The resulting testing area will be square shaped and will be approximately 2x2 meters. Bed sheets or large towels are draped over each of the chairs so that the chairs are fully covered and it is not possible to see through or under the chairs. A baby gate or a removable panel from a dog crate is placed in front of one of the openings between the chairs so that it blocks the opening (C). A bowl with a few dog treats in it is readied but set aside out of reach of the dog.

Figure 5.1

Diagram of the testing area for the L-shaped food finding test

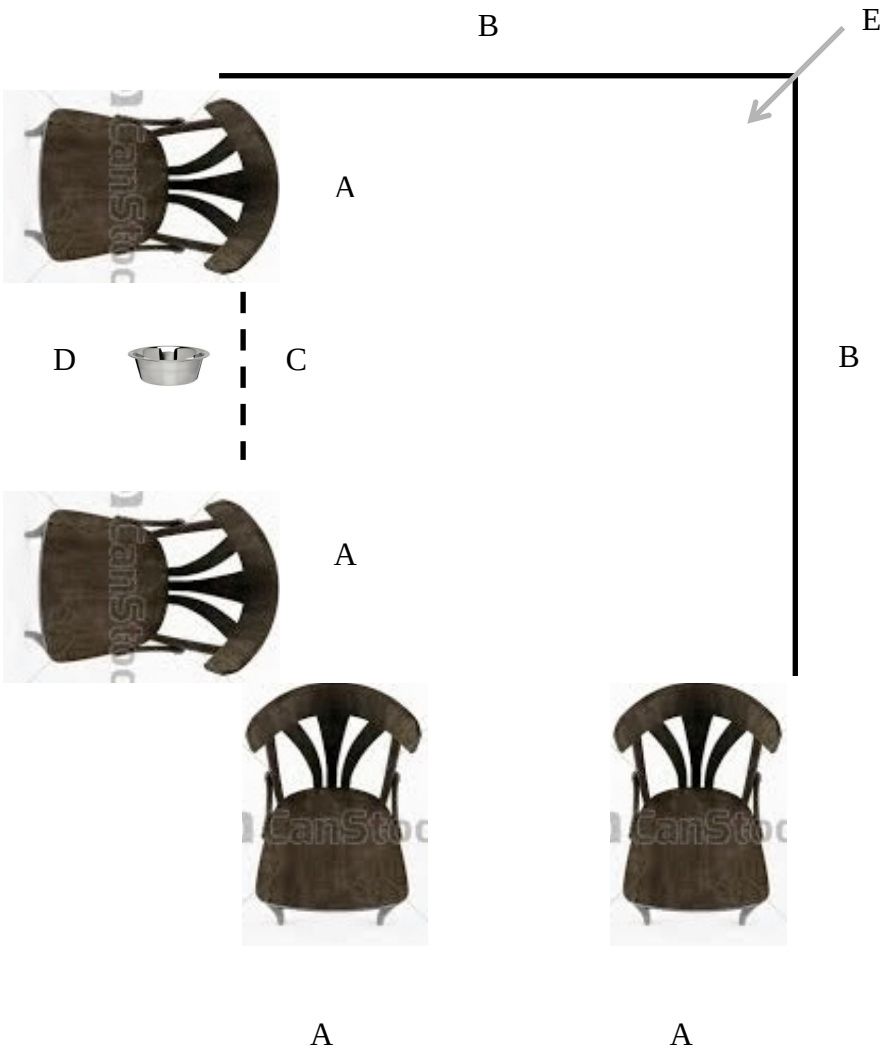


Figure 5.2

Image of the testing area for the L-shaped food finding test with bowl of treats in position

The tester brings the dog into the testing area and allows the dog to freely explore the whole area for a minute. The dog is then put on lead in the testing area. The tester places the bowl of treats on the other side of the gate (D); the dog can see them but not reach them from inside the testing area. The dog is positioned in the back corner of the testing area (i.e. the wall corner) while still on lead (E). The tester removes the dog's lead and the dog is allowed to move freely around the space (including exiting/re-entering the testing area if they choose) for 30 seconds. In order to access the bowl of treats, the dog must exit the testing area through the opening without the barrier and walk around the perimeter to reach the bowl. It is proposed that a dog who is able to access the food is demonstrating greater behavioural flexibility than a dog who is unable to do so, as in the latter case a dog may be fixated on where they can see the food but not reach it rather than testing alternate solutions. Specifically, the test is hypothesised to assess three factors of behavioural flexibility; each factor is assessed by at least one of six items

referencing observable behaviours during the test (see Table 5.1 for the complete testing battery):

- the ability to problem solve (i.e. is the dog able to access the food), which is assessed by four items:

  Q1. Does the dog access the food (i.e. bowl of treats) within 30 seconds? (yes/no)

  Q2. Does the dog go to the gate at any point during the task? (yes/no)

  Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task? (yes/no)

  Q6. What behaviour(s) does the dog exhibit during the task? (all behaviours from a predefined ethogram recorded [see Appendix N], e.g. barking, whining, or tick "other" and write in a response)

- distractibility / ability to focus attention / ability to break attention (i.e. does the dog demonstrate flexibility in their attention by staying focused on figuring out how to access the food or are they distracted by other things), which is assessed by one item:

  Q5. Does the dog exit and then re-enter the testing area before getting to the food? (yes/no)

- social attention toward owner or family (i.e. does the dog demonstrate flexibility by using the environment to help them determine how to access the food, such as looking at the tester for cues), which is assessed by one item:

  Q4. Does the dog look at the tester at any point during the task? (yes/no)

The Time alone test: This test is an "isolation test" that incorporates elements of a "Strange Situation test"; it is hypothesised that a dog who is more behaviourally flexible will cope better with being alone, even if the environment is unfamiliar, and will also be able to cope with the tester exiting and entering the environment multiple times. The test takes place in a room or a cordoned off area of a larger space. Five toys are placed around the perimeter of the room or testing area without the dog present. If it is not possible to see inside the room or testing area from the outside, then a video camera is used to record the dog's behaviour when the tester is outside. The dog is brought into the room off lead; the dog is left alone in the room and allowed to explore for 30 seconds. The tester re-enters the room and attempts to engage the dog in play using the toys. If the dog is willing, the play continues for two minutes. The tester then leaves the room for another two minutes, after which point they re-enter the room and attempt to initiate play with the dog using the toys for a final two-minute period. It is proposed that a dog with greater behavioural flexibility will be able to better cope with the tester leaving the room (e.g. by playing with the toys while alone, not waiting near the door, by exploring the room). It is recognised that dogs' interest in play and toys can vary (e.g. Tóth, Gácsi, Topál, & Miklósi, 2008) and that their coping styles can vary (e.g. Horváth, Igyártó, Magyar, & Miklósi, 2007). However, differences in dogs' behaviour when left alone and then when reunited with the tester, may be suggestive of their level of behavioural flexibility. As such, the test is hypothesised to assess four of the factors theorised to comprise behavioural flexibility; each factor is assessed by at least one of 12 items referencing observable behaviours during the test (see Table 5.1 for the complete testing battery):

- the ability to occupy oneself (i.e. does the dog demonstrate flexibility by using items in the environment to occupy themselves), which is assessed by one item:

  Q2. Does the dog pick up or play with any of the toys immediately upon entering the room? (yes/no)

- distractibility / ability to focus attention / ability to break attention (i.e. does the dog demonstrate flexibility in their attention by switching between playing with the toys and focusing on the tester), which is assessed by three items:

  Q5. Does the dog continue or return to playing with the toys after the tester leaves the room? (yes/no)

  Q6. If yes to question 5, for how long does the dog continue to play with the toys? (number of seconds or minutes)

  Q7. If yes to question 5, when the tester re-enters the room does the dog stop playing with the toys? (yes/no)

- social attention toward owner or family (i.e. does the dog demonstrate flexibility in the way in which they interact with the tester, such as greeting or playing with the tester, and coping when they are not present), which is assessed by seven items:

  Q3. Does the dog approach or greet the tester after they enter the room for the first time? (yes/no)

  Q4. Does the dog reciprocate when the tester initially attempts to engage in play with the dog using the toys? (yes/no)

Q8. Does the dog approach or greet the tester when they re-enter the room? (yes/no)

Q9. Does the dog reciprocate when the tester attempts to engage in play with the dog using the toys for the second time? (yes/no)

Q10. If yes to question 9, for how long does the dog continue to play with the tester? (number of seconds or minutes)

Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room? (yes/no)

Q12. Does the dog stand by the door when the tester is not in the room? (yes/no)

- social skills (appropriate responsiveness in an environment or circumstances) (i.e. does the dog demonstrate flexibility by their willingness to explore the room, even if it is an unfamiliar environment), which is assessed by one item:

  Q1. Does the dog explore the room immediately upon entering it? (yes/no)

The Three-toy test: It is hypothesised that a more behaviourally flexible dog will be willing to allow the tester to exchange the toy they are currently playing with for another toy, and will be willing to continue playing with the new toy. In the test, without the dog present, various types of toys (e.g. rope toys, balls, squeaky toys) are placed in a bucket or similar container in the centre of the testing room. The dog is brought into the room off lead and allowed to choose three toys from the bucket. The tester ranks the toys in order of the dog's preference (i.e. first toy chosen = #1; second toy chosen = #2; third toy chosen = #3). The tester removes toy #1 and toy #2 from the room or out of the dog's proximity. The dog is allowed to play with toy

#3 for two minutes. The tester then presents the dog with toy #1 to see if the dog is willing to exchange toy #3 for toy #1. As was noted regarding the *Time alone test*, it is acknowledged that dogs' interest in play and toys can vary widely (e.g. Tóth et al., 2008). However, it is proposed that a dog with greater behavioural flexibility will show interest in all three toys and will be willing to exchange the toys. As such, the test is hypothesised to assess two of the factors theorised to comprise behavioural flexibility; each factor is assessed by at least one of seven items referencing observable behaviours during the test (see Table .1 for the complete testing battery):

- the ability to occupy oneself (i.e. does the dog demonstrate flexibility by using items in the environment to occupy themselves), which is assessed by four items:

  Q1. Upon entering the room, does the dog approach the bucket of toys? (yes/no)

  Q2. Does the dog choose one or more toys from the bucket? (yes/no)

  Q3. If no to question 2, what behaviour(s) does the dog display instead of choosing a toy(s)? (all behaviours from a predefined ethogram recorded [see Appendix N], e.g. barking, whining, or tick "other" and write in a response)

  Q7. If yes to question 6, does the dog proceed to play with toy #1? (yes/no)

- social skills (appropriate responsiveness in an environment or circumstances) (i.e. does the dog demonstrate flexibility in their behaviour with the toys and tester at the same time), which is assessed by three items:

Q4. If the dog chooses three toys, is he/she willing to play with toy #3 once toy #1 and toy #2 are removed? (yes/no)

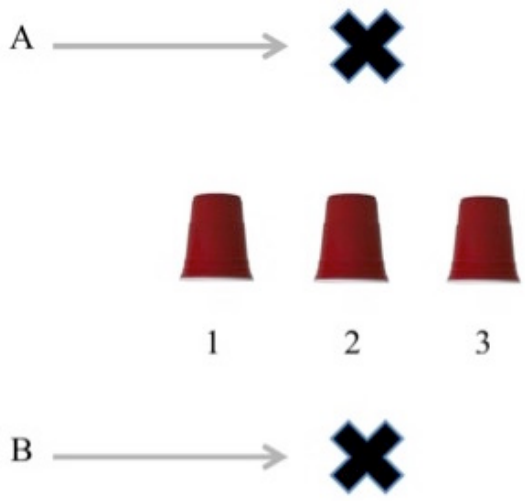
Q5. If yes to question 4, how long does he/she play with the toy? (number of seconds or minutes)

Q6. Is the dog willing to exchange toy #3 for toy #1? (yes/no)

The Pointing test: It is hypothesised that a dog who is more behaviourally flexibly will be able better able to use the cues given by the tester (i.e. pointing) to choose a cup, and they will continue to use the cues through a series of phases. The test is comprised of four phases. Without the dog present, three opaque cups are placed upside down in a row on the floor of the testing room with approximately 45 cm between each cup. The cups are labelled 1, 2, and 3 (see Figure 5.3).

Figure 5.3

Pointing test set-up diagram



In the first phase the tester hides a treat under cup 1. The dog is brought into the room on lead. If there is a second handler available they position the dog so that they are in front of the cups but cannot reach them while on lead (see A in Figure 5.3). (If there is not a second handler available, the dog can be tethered on lead in

front of the cups.) The tester stands facing the dog with the row of cups between them (see B in Figure 5.3); with the dog looking toward them, the tester points to cup 1. The dog is then let off lead and is allowed approach the cups and freely explore the room. Once the dog explores the room and/or chooses a cup, they are led out of the room or positioned so that they are not facing the cups, which ends the phase. In the second, third, and fourth phases, the process of positioning the dog in front of the cups, the tester pointing to a cup, and letting the dog off lead is repeated, with the treat placed under a particular cup in between the phases. In the second phase, the treat is placed under cup 1 and the tester points to cup 3. In the third phase, the treat is placed under cup 3 and the tester points to cup 3. In the fourth phase, the treat is placed under cup 3 and the tester points to cup 1. It is well established that dogs can respond to human pointing gestures (e.g. Hare, Call, & Tomasello, 1998), so it is proposed a dog with greater behavioural flexibility will use the tester's pointing as a cue for which cup to choose. Hare and Tomasello (2005) noted that dogs show remarkable flexibility in using human pointing gestures to problem solve, so this type of task may be well suited to assess behavioural flexibility in the current study. As such, the test is hypothesised to assess four of the factors theorised to comprise behavioural flexibility; each factor is assessed by at least one of 23 items referencing observable behaviours during the test (see Table 5.1 for the complete testing battery):

- the ability to problem solve (i.e. does the dog demonstrate flexibility in using cues from the tester and process of elimination to find the treat), which is assessed by six items:

  Q4. (Phase 1) Does the dog tip that cup over? (yes/no)

  Q10. (Phase 2) Does the dog tip that cup over? (yes/no)

Q11. (Phase 2) Does the dog then investigate another cup even if they located the correct cup first? (yes/no)

Q12. (Phase 2) If yes to question 11 and if the dog did not locate the correct cup first, do they investigate and tip over the other two cups until they locate the correct one? (yes/no)

Q16. (Phase 3) Does the dog tip that cup over? (yes/no)

Q21. (Phase 4) Does the dog tip that cup over? (yes/no)

- distractibility / ability to focus attention / ability to break attention (i.e. does the dog demonstrate flexibility in their ability to focus attention to find the treat), which is assessed by up to five items:

  Q5. (Phase 1) Does the dog then investigate another cup even if they located the correct cup first? (yes/no)

  Q6. (Phase 1) If yes to question 5 and if the dog did not locate the correct cup first, do they investigate and tip over the other two cups until they locate the correct one? (yes/no)

  Q17. (Phase 3) Does the dog then investigate another cup even if they located the correct cup first? (yes/no)

  Q22. (Phase 4) Does the dog then investigate another cup even if they located the correct cup first? (yes/no)

  Q23. (Phase 4) If yes to question 22 and if the dog did not locate the correct cup first, do they investigate and tip over the other two cups until they locate the correct one? (yes/no)

- consistency of responses / ability to generalise responses, (i.e. does the dog demonstrate flexibility in using cues from the tester that change from phase to phase), which is assessed by up to six items:

Q7. (Phase 2) Once the dog is let off lead, does he/she approach the cups? (yes/no)

Q8. (Phase 2) If no to question 7, what behaviour(s) does the dog display instead of approaching the cups? (Tick all that apply from a list of behaviours, e.g. barking, whining, or tick “other” and write in a response.)

Q13. (Phase 3) Once the dog is let off lead, does he/she approach the cups? (yes/no)

Q14. (Phase 3) If no to question 13, what behaviour(s) does the dog display instead of approaching the cups? (yes/no)

Q18. (Phase 4) Once the dog is let off lead, does he/she approach the cups? (yes/no)

Q19. (Phase 4) If no to question 18, what behaviour(s) does the dog display instead of approaching the cups? (Tick all that apply from a list of behaviours, e.g. barking, whining, or tick “other” and write in a response.)

- social attention (toward owner or family) (i.e. does the dog demonstrate flexibility in using the cues from the tester versus using information from previous phases, such as which cup had the treat under it), which is assessed by six items:

  Q1. (Phase 1) Once the dog is let off lead, does he/she approach the cups? (yes/no)

  Q2. (Phase 1) If no to question 1, what behaviour(s) does the dog display instead of approaching the cups? (all behaviours from a predefined

ethogram recorded [see Appendix N], e.g. barking, whining, or tick "other" and write in a response)

Q3. (Phase 1) Which cup does the dog choose first? (Tick cup 1, 2, or 3.)

Q9. (Phase 2) Which cup does the dog choose first? (Tick cup 1, 2, or 3.)

Q15. (Phase 3) Which cup does the dog choose first? (Tick cup 1, 2, or 3.)

Q20. (Phase 4) Which cup does the dog choose first? (Tick cup 1, 2, or 3.)

The test battery was then extensively piloted for feasibility and practicality (see Appendix O for a description of the complete piloting process).

Table 5.1

Hypothetical relationship between test battery and the six factors theorised to comprise behavioural flexibility in dogs and which factor each item is assessing by test

	Factor					
	Ability to occupy oneself	**Ability to problem solve**	**Distractibility / ability to focus attention / ability to break attention**	**Consistency of responses / ability to generalise responses**	**Social attention (toward owner or family)**	**Social skills (appropriate responsiveness in an environment or circumstances)**
L-shaped food finding test		Q1. Does the dog access the food within 30 seconds? Q2. Does the dog go to the gate at any point during the task? Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task? Q6. What behaviour(s) does the dog exhibit during the task?	Q5. Does the dog exit and then re-enter the testing area before getting to the food?		Q4. Does the dog look at the tester at any point during the task?	
Time alone test	Q2. Does the dog pick up or play with any of the toys immediately upon entering the room?		Q5. Does the dog continue or return to playing with the toys after the tester leaves the room? Q6. If yes to question 5, for how long does the dog continue to play with the toys? Q7. If yes to question 5, when the tester re-enters the room does the dog stop playing with the toys?		Q3. Does the dog approach or greet the tester after they enter the room for the first time? Q4. Does the dog reciprocate when the tester initially attempts to engage in play with the dog using the toys? Q8. Does the dog approach or greet the tester when they re-enter the room? Q9. Does the dog reciprocate when the tester attempts to engage in play with the dog using the toys for the second time? Q10. If yes to question 9, for how long does the dog continue to play with the tester? Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room? Q12. Does the dog stand by the door when the tester is not in the room?	Q1. Does the dog explore the room immediately upon entering it?

	Ability to occupy oneself	Ability to problem solve	Distractibility / ability to focus attention / ability to break attention	Consistency of responses / ability to generalise responses	Social attention (toward owner or family)	Social skills (appropriate responsiveness in an environment or circumstances)
Three-toy test	Q1. Upon entering the room, does the dog approach the bucket of toys? Q2. Does the dog choose one or more toys from the bucket? Q3. If no to question 2, what behaviour(s) does the dog display instead of choosing a toy(s)? Q7. If yes to question 6, does the dog proceed to play with toy #1?					Q4. If the dog chooses three toys, is he/she willing to play with toy #3 once toy #1 and toy #2 are removed? Q5. If yes to question 4, how long does he/she play with the toy? Q6. Is the dog willing to exchange toy #3 for toy #1?

	Ability to occupy oneself	Ability to problem solve	Distractibility / ability to focus attention / ability to break attention	Consistency of responses / ability to generalise responses	Social attention (toward owner or family)	Social skills (appropriate responsiveness in an environment or circumstances)
Pointing test		Q4. Does the dog tip that cup over? Q10. Does the dog tip that cup over? Q11. Does the dog then investigate another cup even if they located the correct cup first? Q12. If yes to question 11 and if the dog did not locate the correct cup first, do they investigate and tip over the other two cups until they locate the correct one? Q16. Does the dog tip that cup over? Q21. Does the dog tip that cup over?	Q5. Does the dog then investigate another cup even if they located the correct cup first? Q6. If yes to question 5 and if the dog did not locate the correct cup first, do they investigate and tip over the other two cups until they locate the correct one? Q17. Does the dog then investigate another cup even if they located the correct cup first? Q22. Does the dog then investigate another cup even if they located the correct cup first? Q23. If yes to question 22 and if the dog did not locate the correct cup first, do they investigate and tip over the other two cups until they locate the correct one?	Q7. Once the dog is let off lead, does he/she approach the cups? Q8. If no to question 7, what behaviour(s) does the dog display instead of approaching the cups? Q13. Once the dog is let off lead, does he/she approach the cups? Q14. If no to question 13, what behaviour(s) does the dog display instead of approaching the cups? Q18. Once the dog is let off lead, does he/she approach the cups? Q19. If no to question 18, what behaviour(s) does the dog display instead of approaching the cups?	Q1. Once the dog is let off lead, does he/she approach the cups? Q2. If no to question 1, what behaviour(s) does the dog display instead of approaching the cups? Q3. Which cup does the dog choose first? Q9. Which cup does the dog choose first? Q15. Which cup does the dog choose first? Q20. Which cup does the dog choose first?	

5.2. Methods

5.2.1. Preparation of the testing battery for administration

For this purpose, four documents were created: an informed consent form, detailed instructions for testing set-up and administration, an information gathering form, and a testing questionnaire. Due to the citizen science component, comprehension of the documents and ease of completion of the testing questionnaire were of great importance, so they were written with these two factors in mind (Cohn, 2009). As such, items in the testing questionnaire were written in a multiple choice or binary format (yes/no) whenever possible. These items were focused on objective observations of a dog's behaviour during the tests, with the goal of avoiding any subjective interpretations, which have been reported to be an issue in dog assessments (Mornement et al., 2010).

5.2.2. Sample recruitment and testing administration

Two populations were assessed: shelter dogs and long-term owned dogs. Four samples from these populations were used:

1. shelter dogs assessed by the principal investigator,
2. shelter dogs assessed using a citizen science approach,
3. long-term owned dogs assessed by the principal investigator, and
4. long-term owned dogs assessed using a citizen science approach.

The shelter dogs were the experimental population and the long-term owned dogs were the comparison population. The latter was used as a comparison population as it seems there is some degree of stability in such dog-owner relationships as evidenced by the fact that they have remained in the same home long-term. The necessary criterion for inclusion in the shelter dog samples was that the dog was not currently owned by an individual and needed to be rehomed. The necessary criteria

for inclusion in the long-term owned dog samples were: that the dog has been owned by the same individual (i.e. the current owner) for a minimum of one year, that the current owner was at least 18 years old when the dog was acquired, and that the current owner has lived in the same household as the dog for the majority of time the since acquisition.

The sample of shelter dogs that was assessed by the principal investigator was recruited from three rehoming organisations that had participated in another study in the current research (see Chapter 4). The organisations were asked to sign an informed consent form, which explained the nature of the study, for each dog that was assessed (see Appendix P). The principal investigator also completed an information gathering form about each dog, which contained items such as the dog's weight, age (approximate or known), and how long they had been part of the organisation (see Appendix Q). As none of the participating organisations were site-based (i.e. all dogs resided in foster homes or rented kennels), testing for that sample took place in public or communal areas that were suitable for the purposes (e.g. a closed-off room at a local pet supply store). For both samples of dogs assessed by the principal investigator, responses to the items from the testing questionnaire were manually recorded in a spreadsheet format during testing and were later inputted into an electronic spreadsheet for data analysis.

The shelter dog sample that was assessed by a citizen science approach was recruited through social media, by word of mouth, and by written enquiry. Those contacted through a written enquiry were from the list of rehoming organisations in the UK compiled via the Association of Dogs and Cats Homes (ADCH) website (www.adch.org.uk) and in the US compiled via the Petfinder website (www.petfinder.com/animal-shelters-and-rescues/), which was also used for

participant recruitment in Chapters 2 and 3. A total of 48 organisations were contacted via email from that list between September 2016 and January 2017 (see Appendix T for written enquiry). Staff members or volunteers from the organisations were asked to assess the dogs that were part of their organisation. Representatives from two organisations responded to the written enquiry and were willing to assess their organisations' dogs. The same types of forms (e.g. an informed consent form) were used for this sample of shelter dogs as with the sample assessed by the principal investigator; for this sample they were completed electronically via an online survey platform (Qualtrics).

The sample of long-term owned dogs assessed by the principal investigator was recruited via word of mouth. In some cases, multiple dogs from the same household were assessed. The same types of forms (e.g. an informed consent document) were completed for this sample as for the shelter dog samples, but a separate set of forms was completed for each dog in multi-dog households (see Appendices R and S for informed consent document and information gathering form).

For the sample of long-term owned dogs assessed using a citizen science approach, owner-dog dyads were recruited via social media, by word of mouth, and through recent publications about the studies in progress (e.g. *Scientific American* ["Wanted! Citizen Researchers", 2015]); dog owners were asked to assess their own dog(s). The same types of forms (e.g. an informed consent form) were used for this sample as they were for the previous samples; they were completed electronically via an online survey platform (Qualtrics). If dog owners were testing more than one of their own dogs, they were asked to complete the necessary forms for each dog separately.

In order to assess the test-retest reliability of the testing battery, a subset of the shelter dog sample that was assessed by the principal investigator was retested approximately one month later. Dogs who had not yet been rehomed in the time since initial assessment and were available for retesting (e.g. were not sick or transferred to another rehoming organisation) comprised this subset. All participants in the shelter dog and long-term owned dog samples assessed via a citizen science approach were also asked to retest their dogs twice, once two weeks later and again three months after the initial assessment.

5.2.3. Data analysis

Data analysis was done using SPSS versions 24 and 25. In order to determine whether dogs who have remained in homes long-term show evidence of greater flexibility than dogs in animal shelters, it was first necessary to ensure that the four tests were reliable (Taylor & Mills, 2006). In order to do this, an iterative series of statistical analyses were conducted first on the individual tests and then on the whole testing battery (see Table 5.2). All tests were first analysed using Chi-square tests to investigate whether two potential confounds (dog weight and the means by which the dog was tested, i.e. by the principal investigator or via a citizen science approach) were associated with test outcome. Pearson Chi-square and Fisher's exact test values were considered in each analysis due to potentially small sample sizes, in which case Fisher's exact test values would be appropriate (Field, 2009). For analyses involving dog weight, the samples were grouped into two weight categories: ≤11 kg (labelled as "small") and >11 kg (labelled as "other"). Following this, a series of discriminant function analyses using a stepwise classification were conducted on each test using items that were not affected by dog weight or testing means, for the purpose of investigating whether the items could

statistically distinguish between the two populations and successfully classify dogs into the correct population. The relevant items were taken forward and combined to form the testing battery of measures. A final series of discriminant function analyses using a stepwise classification were conducted to investigate whether they could be used as a testing battery to successfully classify dogs into the correct population. The level of significance used for all analyses was $p = .05$, with no correction for multiple testing as this was developmental research and the risk of excluding valuable tests through a type 1 error was outweighed by the risk of a type 2 statistical error.

Table 5.2

Data analysis for individual tests and the entire testing battery

	L-shaped food finding test	Time alone test	Three-toy test	Pointing test
To investigate whether dog weight was associated with test outcome	Chi-square tests using shelter dog samples	Chi-square tests using shelter dog samples	Chi-square tests using shelter dog samples	Chi-square tests using shelter dog samples
To investigate whether the means by which the dog was assessed was associated with test outcome	1. Chi-square tests using shelter dog samples 2. Chi-square tests using long-term owned dog samples	1. Chi-square tests using shelter dog samples 2. Chi-square tests using long-term owned dog samples	1. Chi-square tests using shelter dog samples 2. Chi square tests using long-term owned dog samples	1. Chi-square tests using shelter dog samples 2. Chi square tests using long-term owned dog samples
To investigate whether each test was able to distinguish between the two populations and successfully classify dogs into the correct population	Discriminant function analysis with items not affected by dog weight or testing means using all dogs	Discriminant function analysis with items not affected by dog weight or testing means using all dogs	Discriminant function analysis with items not affected by dog weight or testing means using all dogs	Discriminant function analysis with items not affected by dog weight or testing means using all dogs
To investigate whether the testing battery was able to distinguish between the two populations and successfully classify dogs into the correct population	Discriminant function analysis with items from each test that are able to distinguish between the two populations and successfully classify dogs into the correct populations			

5.3. Results

The shelter dog sample assessed by the principal investigator (n=85) was initially tested between September 2016 and December 2017. The long-term owned dog sample assessed by the principal investigator (n=21) was tested between March and April 2018. The shelter dog sample assessed via a citizen science approach (n=34) was tested between February and December 2017. The long-term owned dog sample assessed via a citizen science approach (n=29) was tested between April 2016 and November 2017. (Information on breed or type of dog was not collected

for any of the samples.) Not all dogs were assessed in all four tests in any of the samples, so sample sizes varied by test and by item within each test; they ranged from n=18 to n=111.

5.3.1. The L-shaped food finding test

Table 5.3

L-shaped food finding test: distribution of dogs by origin and testing means

	Tested by the principal investigator	Tested via a citizen science approach	Totals
Shelter dogs	n=46	n=17	n=63
Long-term owned dogs	n=21	n=27	n=48
Totals	n=67	n=44	n=111

Five of the six items (i.e. Q1-Q5) from this test were used to investigate whether dog weight or the means by which the dog was tested were associated with item outcome. The sixth item (Q6) was not included; due to the wide range of behaviours selected by respondents for this item, it was determined that no meaningful analysis could be conducted at this stage. Dog weight was not associated with item outcomes in the shelter dog samples (see Table 5.4), so all five items were taken forward for further analysis.

Table 5.4

L-shaped food finding test: p-values from Chi-square tests to determine if dog weight in the shelter dog samples is associated with item outcome (n=63)

Item	Sample sizes of "small" weight dogs (i.e. ≤11 kg)	Sample size of "other" weight dogs (i.e. >12 kg)	p-values
Q1. Does the dog access the food within 30 seconds?	yes: n=8 no: n=38	yes: n=6 no: n=11	.174[1]
Q2. Does the dog go to the gate at any point during the task?	yes: n=31 no: n=15	yes: n=15 no: n=2	.121[1]
Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task?	yes: n=39 no: n=7	yes: n=17 no: n=0	.175[1]
Q4. Does the dog look at the tester at any point during the task?	yes: n=30 no: n=16	yes: n=14 no: n=3	.188
Q5. Does the dog exit and then re-enter the testing area before getting to the food?	yes: n=2 no: n=44	yes: n=0 no: n=17	1.000[1]

[1] Fisher's exact test statistic

The means by which the dog was tested was not associated with item outcome in the shelter dog sample and the long-term owned dog sample (see Table 5.5 and Table 5.6), so all five items were taken forward for further analysis.

Table 5.5

L-shaped food finding test: p-values from Chi-square tests to determine if means by which dog was tested in the shelter dog samples is associated with item outcome (n=63)

Item	Sample sizes of dogs tested by the principal investigator	Sample sizes of dogs tested via a citizen science approach	p-values
Q1. Does the dog access the food within 30 seconds?	yes: n=8 no: n=38	yes: n=6 no: n=11	.174
Q2. Does the dog go to the gate at any point during the task?	yes: n=31 no: n=15	yes: n=15 no: n=2	.121
Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task?	yes: n=39 no: n=7	yes: n=17 no: n=0	.175
Q4. Does the dog look at the tester at any point during the task?	yes: n=30 no: n=16	yes: n=14 no: n=3	.188[1]
Q5. Does the dog exit and then re-enter the testing area before getting to the food?	yes: n=2 no: n=44	yes: n=0 no: n=17	1.000

[1] Fisher's exact test statistic

Table 5.6

L-shaped food finding test: p-values from Chi-square tests to determine if means by which dog was tested in the long-term owned dog samples is associated with item outcome (n=48)

Item	Sample sizes of dogs tested by the principal investigator	Sample sizes of dogs tested via a citizen science approach	p-values
Q1. Does the dog access the food within 30 seconds?	yes: n=8 no: n=13	yes: n=17 no: n=10	.087
Q2. Does the dog go to the gate at any point during the task?	yes: n=10 no: n=11	yes: n=10 no: n=17	.461
Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task?	yes: n=14 no: n=7	yes: n=19 no: n=8	.784
Q4. Does the dog look at the tester at any point during the task?	yes: n=12 no: n=9	yes: n=20 no: n=7	.217
Q5. Does the dog exit and then re-enter the testing area before getting to the food?	yes: n=0 no: n=21	yes: n=3 no: n=24	.246[1]

[1]Fisher's exact test statistic

The discriminant function analysis indicated that two items were useful for discriminating between the two populations (shelter dogs: n=63, long-term owned dogs: n=48): Q1. *Does the dog access the food within 30 seconds?*, and Q2. *Does the dog go to the gate at any point during the task?* The two items were better at correctly classifying dogs into the long-term owned population (83.3%) than they were at correctly classifying them into the shelter dog population (52.4%) (see Table 5.3 for distributions; see Appendix U for complete DFA results). Because these two items were able to correctly classify the dogs into the long-term owned population better than at chance or with a single fixed choice, the items were taken forward for a combined a discriminant function analysis with items from the rest of the testing battery (see subsection 5.3.5).

5.3.2. The Time alone test

Table 5.7

Time alone test: distribution of dogs by origin and testing means

	Tested by the principal investigator	Tested via a citizen science approach	Totals
Shelter dogs	n=55[1]	n=18[1]	n=73
Long-term owned dogs	n=21	n=23[1]	n=44
Totals	n=76	n=41	n=117

[1] The sample size was smaller for some analyses

Eight of the 12 items from this test were used to investigate whether dog weight or the means by which the dog was tested were associated with item outcome. The other four items (i.e. Q5, Q6, Q7, Q10) were not included as they were contingent on previous items. Dog weight was associated with the outcome of two items (i.e. Q2 and Q4) in the shelter dog samples (see Table 5.8). The remaining six items were taken forward for further analysis.

Table 5.8

Time alone test: p-values from Chi-square tests to determine if dog weight in the shelter dog sample is associated with item outcome (sample size varies by item)

Item	Sample sizes of "small" weight dogs (i.e. ≤11 kg)	Sample sizes of "other" weight dogs (i.e. >12 kg)	Fisher's exact test p-value
Q1. Does the dog explore the room immediately upon entering it?	yes: n=49 no: n=6	yes: n=15 no: n=0	.329
Q2. Does the dog pick up or play with any of the toys immediately upon entering the room?	yes: n=52 no: n=9	yes: n=6 no: n=9	.002
Q3. Does the dog approach or greet the tester after they enter the room for the first time?	yes: n=39 no: n=16	yes: n=14 no: n=1	.095
Q4. Does the dog reciprocate when the tester initially attempts to engage in play with the dog using the toys?	yes: n=12 no: n=43	yes: n=8 no: n=7	.025
Q8. Does the dog approach/greet tester when they re-enter room?	yes: n=48 no: n=8	yes: n=13 no: n=2	1.000
Q9. Does the dog reciprocate when tester attempts to engage in play with toys for second time?	yes: n=15 no: n=41	yes: n=8 no: n=7	.066
Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room?	yes: n=40 no: n=7	yes: n=14 no: n=1	.667
Q12. Does the dog stand by the door when the tester is not in the room?	yes: n=29 no: n=18	yes: n=13 no: n=2	.112

The means by which the dog was tested was associated with the outcomes of four items (i.e. Q2, Q4, Q9, Q12) in the shelter dog samples (see Table 5.9).

Table 5.9

Time alone test: p-values from Chi-square tests to determine if means by which dog was tested in the shelter dog samples is associated with item outcome (sample size varied by item)

Item	Sample sizes of dogs tested by the principal investigator	Sample sizes of dogs tested via a citizen science approach	p-value
Q1. Does the dog explore the room immediately upon entering it?	yes: n=49 no: n=6	yes: n=18 no: n=0	.326[1]
Q2. Does the dog pick up or play with any of the toys immediately upon entering the room?	yes: n=3 no: n=52	yes: n=7 no: n=11	.001[1]
Q3. Does the dog approach or greet the tester after they enter the room for the first time?	yes: n=39 no: n=16	yes: n=17 no: n=1	.054[1]
Q4. Does the dog reciprocate when the tester initially attempts to engage in play with the dog using the toys?	yes: n=12 no: n=43	yes: n=10 no: n=8	.007
Q8. Does dog approach/greet tester when they re-enter room?	yes: n=46 no: n=8	yes: n=15 no: n=2	1.000[1]
Q9. Does dog reciprocate when tester attempts to engage in play with toys for second time?	yes: n=14 no: n=40	yes: n=9 no: n=8	.038
Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room?	yes: n=38 no: n=7	yes: n=16 no: n=1	.427[1]
Q12. Does the dog stand by the door when the tester is not in the room?	yes: n=27 no: n=18	yes: n=15 no: n=2	.034

[1] Fisher's exact test statistic

The means by which the dog was tested was associated with the outcomes of four items (i.e. Q2, Q4, Q9, Q12) in the long-term owned dog samples (see Table 5.10).

Table 5.10

Time alone test: p-values from Chi-square tests to determine if means by which dog was tested in the long-term owned dog samples is associated with item outcome (sample size varied by item)

Item	Sample sizes of dogs tested by the principal investigator	Sample sizes of dogs tested via a citizen science approach	p-value
Q1. Does the dog explore the room immediately upon entering it?	yes: n=16 no: n=5	yes: n=18 no: n=5	1.000[1]
Q2. Does the dog pick up or play with any of the toys immediately upon entering the room?	yes: n=3 no: n=18	yes: n=9 no: n=14	.065
Q3. Does the dog approach or greet the tester after they enter the room for the first time?	yes: n=12 no: n=9	yes: n=22 no: n=1	.003[1]
Q4. Does the dog reciprocate when the tester initially attempts to engage in play with the dog using the toys?	yes: n=5 no: n=16	yes: n=18 no: n=5	< .001
Q8. Does dog approach/greet tester when they re-enter room?	yes: n=15 no: n=6	yes: n=18 no: n=3	.454[1]
Q9. Does dog reciprocate when tester attempts to engage in play with toys for second time?	yes: n=3 no: n=18	yes: n=16 no: n=5	< .001
Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room?	yes: n=18 no: n=3	yes: n=16 no: n=4	.697[1]
Q12. Does the dog stand by the door when the tester is not in the room?	yes: n=14 no: n=7	yes: n=11 no: n=9	.444

[1] Fisher's exact test statistic

Those items for which there was a possible association between dog weight and/or the means by which the dog was tested and item outcome were not taken forward for further analyses (i.e. Q2, Q3, Q4, Q9, Q12). The discriminant function analysis with the remaining three items (i.e. Q1, Q8, Q11) with the full sample (shelter dogs: n=62, long-term owned dogs: n=32) indicated that only one item was able to statistically discriminate between the two populations: Q8. *Does dog approach/greet tester when they re-enter room?* However, the item was better at correctly classifying dogs into the shelter population (85.9%) than it was at correctly classifying dogs into the long-term owned population (21.4%) (see Appendix U for complete DFA results). Because this item was able to correctly classify dogs into the shelter population better than at chance or with a single fixed choice, it was

taken forward for a combined a discriminant function analysis with items from the rest of the testing battery (see subsection 5.3.5).

5.3.3. The Three-toy test

Table 5.11

Three-toy test: distribution of dogs by origin and testing means

	Tested by the principal investigator	Tested via a citizen science approach	Totals
Shelter dogs	n=80	n=29	n=109
Long-term owned dogs	n=0	n=19	n=19
Totals	n=80	n=48	n=128

This test is comprised of seven items. However, items Q2-Q7 are all contingent upon the first item (i.e. Q1. *Upon entering the room, does the dog approach the bucket of toys?*). The subsequent items pertain to the dogs choosing the toys, but if they do not approach the bucket (i.e. Q1), then they cannot choose toys, and thus the test ends at that point. As such, only the first item was included in the initial analysis. Dog weight was associated with the outcome of that item in the shelter dog samples (see Table 5.12).

Table 5.12

Three toy test: p-values from Chi-square test to determine if dog weight is associated with item outcome in the shelter dog samples (n=109)

Item	Sample sizes of "small" weight dogs (i.e. ≤11 kg)	Sample size of "other" weight dogs (i.e. >12 kg)	p-value
Q1. Upon entering the room, does the dog approach the bucket of toys?	yes: n=29 no: n=33	yes: n=41 no: n=6	< .001

The means by which the dog was tested was associated with item outcome for "other" weight dogs in the shelter dog samples (see Table 5.13). Because the previous analysis for this test determined that dog weight was associated with item outcome, "small" weight dogs (i.e. ≤11 kg) were excluded from this analysis. This analysis was not replicated with only "small" dogs in the shelter dog samples

because the sample size of that weight category that was tested via a citizen science approach was too small (i.e. n=3) for any meaningful analysis. Since both dog weight and the means by which the dog was tested were associated with item outcome, it was determined that this test was unreliable and it was not taken forward for any further analysis with the rest of the testing battery.

Table 5.13

Three-toy test: p-values from Chi-square test to determine if means by which dog was tested for "other" weight dogs (i.e. >12 kg) in the shelter dog samples is associated with item outcome (n=48)

Item	Sample sizes of "other" weight dogs tested by the principal investigator	Sample sizes of "other" weight dogs tested via a citizen science approach	Fisher's exact test p-value
Q1. Upon entering the room, does the dog approach the bucket of toys?	yes: n=15 no: n=6	yes: n=27 no: n=0	.004

5.3.4. The Pointing test

Table 5.14

Pointing test: distribution of dogs by origin and testing means

	Tested by the principal investigator	Tested via a citizen science approach	Totals
Shelter dogs	n=60[1]	n=15[1]	n=75
Long-term owned dogs	n=20[1]	n=17[1]	n=37
Totals	n=80	n=32	n=112

[1] The sample size was smaller for some analyses

Although this test contains 23 items, several of the items are contingent upon a previous item or items, so eight items (i.e. Q4, Q6, Q10, Q12, Q16, Q20, Q21, Q23) were excluded from this analysis at this point. An additional four items (Q2, Q8, Q14, Q19) were also excluded from analysis at this point due to the wide range of behaviours selected by respondents on these items, so it was determined that no meaningful analysis could be conducted. The remaining 11 items were included in an initial analysis with the shelter dog samples; all "small" weight dogs were tested by the principal investigator and all "other" weight dogs were tested via a citizen

science approach, so a single analysis was done. Dog weight and/or the means by with the dog was tested was associated with the outcome of one item (Q18) in the shelter dog samples (see Table 5.15). Because Q22 was in the same phase and contingent on Q18, it was also not taken forward, thereby eliminating all of Phase 4 of the test. The remaining nine items were taken forward.

Table 5.15

Pointing test: p-values from Chi-square tests to determine if dog weight and/or the means by which the dog was tested in the shelter dog samples is associated with item outcome (sample size varied by item)

Phase	Item	Sample sizes of "small" weight dogs (i.e. ≤11 kg)/dogs tested by the principal investigator	Sample sizes of "other" weight dogs (i.e. >12 kg)/dogs tested via a citizen science approach	p-value
1	Q1. Once the dog is let off lead, does he/she approach the cups?	yes: n=32 no: n=20	yes: y=7 no: n=6	.613
	Q3. What cup does the dog choose first?[2]	correct cup: n=14 incorrect cup: n=14	correct cup: n=5 incorrect cup: n=4	1.000[1]
	Q5. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=20 no: n=11	yes: n=5 no: n=5	.472[1]
2	Q7. Once the dog is let off lead, does he/she approach the cups?	yes: n=0 no: n=56	yes: n=1 no: n=14	.211[1]
	Q9. What cup does the dog choose first?[2]	correct cup: n=10 incorrect cup: n=7	correct cup: n=3 incorrect cup: n=6	.411[1]
	Q11. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=10 no: n=7	yes: n=6 no: n=5	1.000[1]
3	Q13. Once the dog is let off lead, does he/she approach the cups?	yes: n=16 no: n=36	yes: n=7 no: n=6	.193[1]
	Q15. What cup does the dog choose first?[2]	correct cup: n=9 incorrect cup: n=4	correct cup: n=6 incorrect cup: n=4	.685[1]
	Q17. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=3 no: n=5	yes: n=5 no: n=6	1.000[1]
4	Q18. Once the dog is let off lead, does he/she approach the cups?	yes: n=14 no: n=37	yes: n=9 no: n=4	.009[1]
	Q22. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=2 no: n=8	yes: n=6 no: n=4	.170[1]

[1] Fisher's exact test statistic

[2] The "correct" cup refers to the one to which the tester was pointing to for each item; the "incorrect" cup refers to either of the other two cups.

Two items (Q7, Q9) were excluded from analysis with the long-term owned dog sample because their sample sizes were too small for any meaningful analysis to be conducted. The means by which the dog was tested was not associated with the

outcomes of the remaining seven items (see Table 5.16), so all items were taken forward for further analyses.

Table 5.16

Pointing test: p-values from Chi-square tests to determine if the means by which the dog was tested in the long-term owned dog sample is associated with item outcome (sample size varied by item)

Phase	Item	Sample sizes of dogs tested by the principal investigator	Sample sizes of dogs tested via a citizen science approach	p-value
1	Q1. Once the dog is let off lead, does he/she approach the cups?	yes: n=14 no: n=6	yes: n=11 no: n=6	.732
	Q3. What cup does the dog choose first?[2]	correct cup: n=5 incorrect cup: n=9	correct cup: n=6 incorrect cup: n=5	.435[1]
	Q5. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=9 no: n=4	yes: n=10 no: n=1	.327[1]
2	Q11. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=2 no: n=6	yes: n=8 no: n=3	.070[1]
3	Q13. Once the dog is let off lead, does he/she approach the cups?	yes: n=8 no: n=12	yes: n=8 no: n=2	.058[1]
	Q15. What cup does the dog choose first?[2]	correct cup: n=2 incorrect cup: n=6	correct cup: n=2 incorrect cup: n=8	1.000[1]
	Q17. Does the dog then investigate another cup even if they located the correct cup first?	yes: n=2 no: n=6	yes: n=7 no: n=3	.153[1]

[1] Fisher's exact test statistic
[2] The "correct" cup refers to the one to which the tester was pointing to for each item; the "incorrect" cup refers to either of the other two cups.

A discriminant function analysis with the nine items that were taken forward (i.e. Q1, Q3, Q5, Q7, Q9, Q11, Q13, Q15, Q17) was conducted with all samples (shelter dogs: n=4, long-term owned dogs: n=14). The analysis indicated that only one item was useful for discriminating between the two populations: Q15. *What cup does the dog choose first?* The item was better at correctly classifying dogs into the shelter population (62.5%) than it was at correctly classifying dogs into the long-term owned population (77.8%) (see Appendix U for complete DFA results). Because this item was able to correctly classify dogs into the shelter population

better than at chance, it was taken forward for a combined a discriminant function analysis with items from the rest of the testing battery (see subsection 5.3.5).

5.3.5. The testing battery: the useful items from each test

The following items were taken forward for a combined analysis:

1. The L-shaped food finding test:

   Q1: *Does the dog access the food within 30 seconds?*

   Q2: *Does the dog go to the gate at any point during the task?*

2. The Time alone test Q8: *Does the dog approach or greet the tester when they re-enter the room?*

3. The Pointing test Q15: *What cup does the dog choose first?*

If only dogs for which there were data for all four items were included in the analysis, the sample size would have been n=15. By eliminating the Pointing test (it had the smallest sample size) a sample size of n=83 could be used in the subsequent analysis (see Table 5.17).

Table 5.17

The testing battery: distribution of dogs by origin and testing means

	Tested by the principal investigator	Tested via a citizen science approach	Totals
Shelter dogs	n=41	n=2	n=43
Long-term owned dogs	n=21	n=19	n=40
Totals	n=62	n=21	n=83

The discriminant function analysis revealed that two items, Q1 and Q2 from the L-shaped food finding test, were able to discriminate between the populations. However, the items were better able to correctly classify long-term owned dogs (82.5%) than shelter dogs (51.2%) (see Appendix U for complete DFA results). In order to try to increase how well the measures correctly classified dogs into the shelter dog population, a further two discriminant function analyses were

undertaken using only the sample of long-term owned dogs, which were reclassified based on their origin into two groups: shelter and "other". The "other" group referred to dogs who originated from anywhere else except a shelter (e.g. pet store, breeder, etc.). The first analysis used all three items (shelter: n=20, "other": n=20); the second analysis used just the two items from the L-shaped food finding test (shelter: n=23, "other": n=26). All the variables in both analyses had F-values less than 1.27, which falls substantially short of 3.84, the conventional threshold used for including them in a DFA. The low F-values indicate that the groups are unlikely to differ meaningfully on the basis of this variable, even when considering the effects of other variables, so the variables could not be meaningfully used to distinguish between the populations. It was determined at this point that the only test and items that may potentially be useful, though would require a larger sample sizes for further investigation, were Q1 and Q2 from the L-shaped food finding test, as these items were able to correctly classify dogs into the long-term owned population better than at chance or with a single fixed choice when using the entire sample. However, for the purposes of the current research, it was determined that as they stand, the four tests are unreliable and are unable to be used to achieve the aim of this chapter: to determine whether dogs who have remained in homes long-term show evidence of greater flexibility than dogs in animal shelters. Because the testing battery was unreliable, an analysis to assess the long-term stability of the tests using was not conducted.

5.4. Discussion

Of the four tests, the L-shaped food finding test was not only the most robust, i.e. only test for which neither dog weight nor the means by which the dog was tested were associated with outcome in the shelter dog sample, but also the one

which was most able to classify dogs into the correct population. The finding that dog weight was a confound in the other three tests is notable. The role of dog weight in the outcome of behaviour tests seems to rarely, if ever, be considered in the published research. However, the results of the current research suggest that it may be that a 5 kg dog displays different behavioural responses in an assessment than a 40 kg dog. Differences in behaviour and temperament test performance have been evaluated on the basis of other factors, such as dog breed or breed group, which may correlate with weight to some degree (Pongrácz, Miklósi, Vida, & Csányi, 2005[18]; Topál, Miklósi, & Csányi, 1997), but weight does not appear to have been considered as a potential confound in task performance, which may not be related to the cognitive differences that may be more expected with breed. Differences based on dog weight have been reported for the ways in which owners interact with their dogs and the training methods used (Arhant, Bubna-Littitz, Bartels, Futschik, & Troxler, 2010) and these might result in developmental differences in behaviour with little direct genetic basis. Given that dogs in shelters are often-mixed breed, so weight, rather than breed may be more readily assessable, it is perhaps even more surprising that this relationship seems to be overlooked in studies that have evaluated the validity and reliability of existing tests (e.g. Bennett et al., 2012; Marder et al., 2013; Poulsen et al., 2010), and is not considered in the development of new tests (e.g. De Palma et al., 2005; Lucidi et al., 2005). Nonetheless, dog weight has been reported to be a significant factor in both adoption and relinquishment, with small dogs significantly more likely to be adopted from shelters (Lepper et al., 2002); medium (10-25 kg) and large weight (>25 kg) dogs are also significantly more likely to be relinquished than small dogs (<10 kg)

[18] The authors of this study did not provide a specific definition for "temperament" in this context.

(Diesel et al., 2008), so investigating differences in shelter dog assessments on the basis of weight would be a useful consideration for future research.

Because the tests in the current research were designed to theoretically assess multiple aspects of behavioural flexibility, and feasibility of administration was a priority, the development process involved in creating the tests was quite rigorous and this may in part explain the poor uptake. The requirements were possibly more demanding than in similar research (e.g. Weckel, Mack, Nagy, Christie, & Wincorn, 2010).

The L-shaped food finding test did not distinguish owned dogs on the basis of their origin, indicating that it might be sensitive to the changes that might occur in even a shelter dog that enable it to remain successfully rehomed in the long term. One perspective of this finding is that it might provide evidence for a similar level of behavioural flexibility in dogs that have remained in a home long-term, and thus support the argument that behavioural flexibility is a key component to the success of the dog-owner relationship. However, set against this, is the failure of other tests predicted to correlate with this test to show similar ability, so this test might be assessing something unique that the other tests are not, which is unrelated to behavioural flexibility. For example, it may be assessing a dog's level of food motivation. Perhaps dogs who did not go the gate at any point during the test and/or did not access the food are less food-motivated than those who did. Regardless of the reason, what these dogs may have in common is that they have been able to meet the demands of the domestic environment, and they are performing similarly on this test. As such, this test may have good predictive validity for which placements will be successful. The predictive validity of any dog behavioural assessment is important (e.g. Harvey et al., 2016; McGarrity, Sinn, Thomas, Marti, & Gosling,

2016; Sinn, Gosling, & Hillard, 2010), but it is particularly key in pre-adoption screening assessment, whether they be for the purposes of risk assessment or matching (Chapter 3; Mornement et al., 2010), but this aspect of validity is rarely reported. This may be because such a study would need to have a longitudinal component, which may not be feasible, as found with the difficulties encountered in the current study. Assessing the predictive validity of the L-shaped food finding test in future studies is justified, based on the results of the current research, to determine its potential usefulness in the rehoming process.

Based on the results of the analyses conducted on the testing battery it is not possible at this point to conclude if the tests were indeed assessing aspects of behavioural flexibility, but this is something that could be investigated in future research. While this may not have affected the results, it should be noted that there was a considerable amount of missing data, particularly in the Pointing test; this may be due to the multiphase test design. There does, however, seem to be something useful about the L-shaped food finding test regardless as it was able to predict correct group membership for dogs in the long-term owned sample better than at chance. This test was theorised to assess a dog's problem solving abilities. Research has indicated that shelter dogs versus pet dogs differ in their problem solving abilities and the mechanisms used to solve problems (Barrera, Fagnani, Carballo, Giamal, & Bentosela, 2015), so this may explain why the shelter dog sample performed differently from the long-term owned dog sample on the L-shaped food finding test in the current study. As noted in the Methods section of this chapter, this test is an adaptation of a "detour test", for which there has been a considerable amount of research to investigate the ways in which dogs differ in their performance on this type of test; however, the dogs included in these studies tend to

be all owned dogs, and often dogs who have been in a home since birth (Osthaus, Marlow, & Ducat, 2010; Pongrácz, Miklósi, Timár-Geng, & Csányi, 2003; Pongrácz et al., 2005). As such, differences in test performance based on whether the dog is owned versus in a shelter have not previously been investigated. Future research to investigate the usefulness of the L-shaped food finding test should use an owned dog sample in which all participants have been in a home since birth, such as was used in Osthaus et al. (2010), and all samples involved should be considerably larger than were used in the current research. The results from research with such samples could allow for greater certainty that the test is able to distinguish between shelter versus owned dogs, which may then help to determine what exactly the test is assessing.

Citizen science has become a popular and often useful method of collecting data (e.g. Cooper, Dickinson, Phillips, & Bonney, 2007; Dickinson, Zuckerberg, & Bonter, 2010; Silvertown, 2009), but the fact that the means by which a dog was tested was associated with item outcome in three of the tests in the current study suggests that caution should be taken prior to beginning analysis when utilising data collected by trained investigators and via a citizen science approach. This is not to say that studies should not collect data via a citizen science approach, as there are several notable advantages to doing so (e.g. larger sample size, faster data collection, increases the general public's awareness of science) (Bonney et al., 2009; Cohn, 2008), only that reliability should not be assumed when engaging less skilled assessors. However, where caution should be taken is in how data collected via this means should be analysed; preliminary analyses should be undertaken to ensure assessment means is not affecting test outcome prior to pooling the data with that collected by trained investigators for further analyses.

Recruitment for the citizen science samples in the study to assess behavioural flexibility in humans (Chapter 4) exceeded expectations and resulted in considerable sample sizes, so similar success in recruitment was anticipated in this dog-related study. Unfortunately, that was not the case. One of the primary reasons for such difficulties in this study may have been due to the feasibility of the tests. Although, there was an ongoing emphasis on the feasibility of administration of the tests as this is highly important in citizen science (Cohn, 2009; Rotman et al., 2012), it is possible that still some aspects were difficult to understand or appeared too time consuming to administer for dog owners or shelter staff and/or volunteers. As such, it may not have been an issue with the actual feasibility of the tests but rather the perception of them, which is the issue. In order to make the set-up and administration of the tests as comprehensible as possible, the instructions were detailed and included diagrams where appropriate, but this may have caused the tests to seem daunting and challenging to administer. For example, the Pointing test was designed with four phases in an attempt capture various reasons why a dog might choose a particular cup (e.g. were they choosing the cup that the tester was currently pointing to or were they choosing the one where they found the treat in the previous phase). However, by including four phases, the duration of the test increased and it necessitated including 23 items. This may also explain why some participants in both samples completed some of the tests, but not the entire battery; perhaps they selected the tests that seemed easiest to administer. Difficulties in recruitment of citizen science participants have been reported to be a hurdle in research; for example Bonney et al. (2009) reported that research developed for specific audiences can face greater challenges in participant recruitment than projects developed for the general public. The authors noted that deliberate

partnering with targeted groups or organisations over the course of research so that the project can be incorporated or melded with the groups' existing policies will yield greater participant recruitment results. In the case of current study, this did occur to an extent, but one way that this could have been taken further is if specific rehoming organisations were partnered with at the outset of study so that they also were involved in the development and piloting of the testing battery and so felt a greater sense of ownership of the tests. By working and collaborating with rehoming organisations from the outset, they could have also provided useful information on what resources they had available and what potential constraints or limitations in testing administration they might have. For example, if an organisation reported that they did not have an adequate testing space to use, such as that required for the Time alone test, then perhaps alterations could have been made earlier in the development process. Additionally, having realistic expectations for the number of dogs an organisation was able or willing to test early in the data collection process would also have been useful. This could have been accomplished by asking organisations in the initial enquiry for participation to indicate how many dogs they expect to be able to assess over a given time period; future research should not assume that organisations that handle a greater number of dogs are necessarily able to assess more dogs.

It should also be noted that a recruitment bias may have been present within both citizen science samples. For the long-term owned dogs, dog owners who were interested in research or enjoy doing activities with their dogs may have been more likely to participate. Similarly, rehoming organisations that tested their dogs may have been more willing to participate if they were interested in research, or if they had the resources available to do so (e.g. volunteers to test dogs).

There is a further consideration with respect to dogs assessed via a citizen science approach rather than by the principal investigator with regards to a dog's relationship to the tester. In both the long-term owned dog samples and the shelter dog samples, there is the question of the dog's relationship to the tester. A dog may behave differently with somebody to whom they are closely bonded, which in this case would be their owner or a shelter staff/volunteer. This may explain why the means by which they were tested was associated with the outcome of some items, such as Q12 in the Left alone test (*Does the dog stand by the door when the tester is not in the room?*); a dog may be more likely to wait by the door if they are closely bonded to the tester (i.e. their owner or shelter staff/volunteer) than to a stranger (i.e. the principal investigator). Additionally, while studies have reported that dogs in shelters exhibit signs of stress (e.g. Coppola, Enns, & Grandin, 2006; Hiby, Rooney, & Bradshaw, 2006), it is unclear aside from that what effect the shelter environment is having on dogs, both while they are in the shelter and post-adoption. Because such effects are unknown, it is therefore not possible to know if or how the shelter environment is affecting the dog assessment process. The effects of the shelter environment on a dog is an area that would greatly benefit from further research.

Conclusion

Although additional research is needed to determine if elements of the testing battery are able to assess behavioural flexibility in dogs, this should not imply that flexibility is not an integral part of how a dog copes in a home environment. The demands of such an environment can vary widely, and a dog's inability to meet those demands could potentially cause conflict to arise, which would likely affect the success of the dog-owner relationship. As such, the

assessment of behavioural flexibility in dogs should not yet be dismissed, but rather the approach in how it is assessed should be readdressed in future research.

Chapter 6

6.1. The current state of dog rehoming practice and a novel approach to it

This thesis has taken a critical look at the dog rehoming process, first by investigating what is reported in the relevant literature, and then by empirically evaluating the current state of policies and procedures involved in the rehoming process. By applying a novel approach and bringing together seemingly unrelated disciplines, a shift in practice is proposed and tested in a field that seems to be largely rooted in tradition.

Pre-adoption dog assessments conducted by organisations have two primary foci: minimising risk and gathering information to match them to adopters (Christensen et al., 2007; Marder et al., 2013; Mornement et al., 2010). However, they also may have two additional purposes: identifying which dogs require additional training or rehabilitation prior to rehoming (Mornement, Coleman, Toukhsati, & Bennett, 2010), and attempting to ensure good welfare and quality of life for the dog in their new home. The quality of the tests or assessments used for this purpose are of concern (Chapters 1 and 3), as it is clear that they are often unreliable, are not predictive of future behaviour, or they have not undergone such an analysis to assess their reliability or validity (Bennett et al., 2012; Christensen et al., 2007; Marder et al., 2013; Poulsen et al., 2009). This has led some (e.g. Patronek & Bradley, 2016) to call for their abandonment. It is evident that there may be a great waste of resources, not least because organisations are not focusing on what skills might be beneficial for a dog to remain in a home. Similarly, the assessments organisations conduct to screen potential adopters tend to be focused on factors that are prone to change over the course of the dog's lifetime (King, 2010),

rather than on factors that might be advantageous to the success of the dog-owner relationship.

The dog-owner relationship is by nature a close personal one that is dynamic, which the research in the field seems to have been ignoring or overlooking, with organisations' rehoming practices tending to follow suit. Within the dog-owner relationship conflict will arise at some point, so the parties' ability to resolve conflict may be integral to the continued success of the relationship. The current research has taken a fresh approach by postulating that key to resolving conflict is behavioural flexibility. Accordingly, assessing this flexibility in both the dog and the adopter may offer a more sound approach to the rehoming process.

The variability in the methods used to make assessments was highlighted in Chapters 2 and 3 and further underlines the concerns about the process, which can have profound implications for dogs (i.e. rehoming versus euthanasia). One can also question the theoretical basis to current tests, which do not seem to take advantage of what little good quality research is available. Thus many risk factors for relinquishment do not seem to be considered in the dog and adopter screening process (e.g. care of dog requires a greater level of effort than expected by an adopter [Diesel et al., 2008]), nor factors that are associated with a *decreased* risk for relinquishment, such as those relating to post-adoption care (e.g. veterinary care and attending training classes) (Diesel et al., 2008; Patronek et al., 1996). It may be that these factors are proxies for other things, such as an owner's awareness of a dog's needs and their willingness to expend resources (e.g. time and money) to meet those needs, which could point to an owner's understanding of a need to be flexible within the relationship for it to succeed. This is evidently important in the literature on placing human foster children into homes, with flexibility in the foster child-

foster parent relationship identified as an important characteristic to the success of the placement (Doelling & Johnson, 1990; Green et al., 1996). This observation formed the basis for the developments in empirical assessment proposed within the thesis.

Measures taken from the human foster care literature were adapted to be relevant to the dog-owner relationship to assess flexibility in humans (Chapter 4). The original factor structure of a measure of parent flexibility that was used in its original version (DOTS-R) could not be replicated, raising concern over its validity, and most of the items on the measure concerning expectations adapted for dogs (i.e. the CAES) were unable to distinguish between populations of dog relinquishers and long-term dog owners. A measure to assess owners' satisfaction of their relationship with their dog was also created as none could be sourced in the literature. Nonetheless, there was a significant difference in the scores of long-term dog owners compared with dog relinquishers on the six-item CAES (i.e. those items that were found to be useful). Four of the six items were on the original *Adaptability* factor, and those items had the greatest effect size; the other two items were on the *Maintenance routine* and *Sleep patterns* factors. Long-term dog owners scored significantly differently from dog relinquishers on each of the six items, and on the summed CAES score (i.e. summed scores were higher for long-term dog owners than dog relinquishers). This result provides evidence that long-term dog owners may be more flexible than dog relinquishers, particularly so in their expectations of how a dog will adapt to novelty and change. The other two items on which they scored significantly differently were on different factors but still both pertained to sleep-related behaviours. There may have been significant differences between scores of the two populations on items pertaining to sleeping and not on

those pertaining to other routine behaviours (e.g. eating) because a dog's sleeping behaviours may have greater potential to affect an owner's day-to-day life. Long-term dog owners may have a greater understanding of dogs' sleep related behaviours, and thus may be able to better anticipate and accommodate them, which could result in their day-to-day lives being less affected. Conversely, dog relinquishers' daily lives may be more greatly affected due to a poorer understanding of sleep-related behaviours, which may lead to a breakdown in the relationship resulting in the dog being relinquished.

The finding that the greatest effect pointed towards long-term dog owners being more flexible in their expectations of a dog's ability to adapt to a new environment is potentially of great importance. Adopting a dog and bringing them into a new environment represents potentially a huge change for a dog, especially considering the myriad varied demands they will encounter in a domestic environment, and it seems that expectations at this time may have a big impact on the future success of the relationship. This deserves further investigation since predictive validity for the adapted measure to assess flexibility in humans could not be established in the current work. A considerably larger total sample size of dog adopters than the one used in the current research (i.e. n=103) would be needed to accomplish this with any confidence. Based on the sample's follow-up response rate of 25%, and the proportion of that subset who relinquished or rehomed their dog to somebody else (2% of the total sample), the sample of dog adopters would need to be approximately 10 times larger. As was noted in Chapter 4, recruiting participants for the dog adopter sample was a time-consuming process. This issue could be addressed in future research to achieve the much larger sample size needed in four ways:

1. by working with larger rehoming organisations (i.e. those that rehome greater quantities of dogs),
2. by using additional trained investigators to recruit participants in person,
3. by partnering with more organisations that are willing to recruit participants on behalf of the principal investigator, or
4. by recruiting participants online who had recently adopted a dog from a shelter or rehoming organisation, such as was done with the long-term dog owner and relinquisher samples in the current research.

In the final experimental phase of this work (Chapter 5) the focus turned to the dog. A battery of tests to theoretically assess different aspects of behavioural flexibility in dogs was developed and piloted, before being administered by both the principal investigator and via a citizen science approach. While there were benefits to employing a citizen science approach (i.e. larger sample size of dogs tested and a further assessment of the feasibility of administration), participant recruitment was challenging and type of tester affected the outcomes of several items on the tests. The majority of measures were found to be unreliable (it is often assumed in this field that tests are reliable, and this highlights the importance of always challenging this assumption), and so it was not possible to assess behavioural flexibility in dogs. However, certain measures within the L-shaped food finding test did seem to have some predictive value.

It is clear from this work that there are many unfounded assumptions that underpin current rehoming practices, and as a result many dogs may be prevented from finding suitable homes. Behavioural flexibility in a dog owner or expectations about how a dog will adapt to a new environment may nonetheless be an important area to focus on. There are also elements of a dog's behaviour, possibly related to

its flexibility that may be important, but the tools needed to evaluate this require further refinement and development.

6.2. Directions for future research

Behavioural flexibility may be a very important aspect of the dog-owner relationship, as the relationship has a close personal nature, coupled with all of the varied demands that a dog faces in a home environment. However, evidence suggests that future research should primarily focus on investigating behavioural flexibility in humans, as it is ultimately the owner who decides to terminate the relationship and relinquish the dog, and this is the area that yielded the most encouraging results in this thesis. Studies have reported on how owner personality and characteristics affect the dog-owner relationship, which highlights the importance of the owner's role in the outcome of the relationship. Meyer & Forkman (2014) report that owner characteristics seem to affect the quality of the dog-owner relationship more than dog characteristics do. Kotrschal, Schöber, Bauer, Thibeaut, and Wedl (2009) report that owner personality dimensions[19] affect the nature of the dog-owner relationship in ways such as interaction style and level of attachment. Similarly, Kis, Turcsán, Miklósi, and Gásci (2012) report that aspects of owner personality[19] are linked to the style of interactions an owner has with their dog, as well as their dog's behaviour.

As already noted in Chapter 3, some have recently suggested a shift away from the usage of dog assessments in shelters (Patronek & Bradley, 2016; Patronek et al., 2019), with Patronek and Bradley (2016) instead proposing that it would be more beneficial for shelters to increase opportunities for potential adopters to interact with dogs in enjoyable ways that mirror behaviours they would routinely

[19] These studies used a five-factor model of human personality.

practice in a home environment post-adoption (e.g. walking on lead, playing, etc.); the authors suggest that information gathered by this means in conjunction with "*a thorough and objective intake history*" would help to identify dogs whose behaviour may be of concern. Given the findings reported in the current thesis, it might be that such activity will help ensure appropriate expectations and so be of some value. However, before this becomes a policy, it is important to be mindful of limitations to this. While these more theoretically natural or real-world interactions between adopters and dogs could influence whether an adopter chooses a dog (Weiss et al., 2012), an attempt to mirror behaviours or situations that a dog would encounter post-adoption, still assumes that these interactions in a shelter setting would have some sort of predictive validity, and there is a lack of evidence to support this assumption. Furthermore, by proposing the usage of "*a thorough and objective intake history*" (Patronek & Bradley, 2016), an assumption is being made that relinquishing owners are able or willing to give an objective and reliable behavioural history of their dog. This assumption is problematic for two reasons. First, because the act of relinquishing a dog is emotionally-charged and complicated by internal and external pressures (DiGiacomo et al., 1998), it is unlikely that an intake history could ever be fully objective. Second, a very limited number of studies (Duffy et al., 2014; Segurson et al., 2005) have evaluated the quality of owner reports, and it should not necessarily be assumed that the information gathered by this means is reliable. Because there is still such debate in the scientific literature over how to address screening or assessing dogs pre-adoption, this is further reason to investigate behavioural flexibility in adopters, rather than supposedly desirable behaviours in dogs per se. There will almost certainly be some aspects of a dog's behaviour post-adoption that is unknown, and so owner flexibility

may be key in accepting this, as indicated by the findings reported in Chapter 4, that long-term dog owners were more flexible in their expectations of dog's ability to adapt to a new environment than relinquishers were.

The 6-item CAES could provide a useful starting point for future research to further investigate the role of owner flexibility in the dog-owner relationship and in the success of dog placements. There are several ways that the CAES could be used to do this. Chapter 4 used the measure to prospectively investigate whether there was a relationship between dog adopters' scores at the point of adoption and their satisfaction with the quality of the relationship with their dog 6-12 months post-adoption. The measure could also be prospectively used with the same population to determine whether there is a relationship between dog adopters' scores and the outcome of the placement (i.e. whether the dog remained in the home or was relinquished). However, in order to do this a much larger sample size would need to be used for any meaningful analysis to be conducted, due to both participant attrition rates in a longitudinal study (see Chapter 4) and adopted dog return/relinquishment rates of ~15% (Diesel et al., 2008; Marston et al., 2004). Another way that the CAES could be used in future research would be to expand on its six reliable items and add additional related items pertaining to the three factors (i.e. *Adaptability*, *Maintenance routine*, *Sleep patterns*). Doing this would require an assessment of the new items' reliability, such as by repeating the iterative process undertaken in Chapter 4, but additional items might highlight further differences between those who have kept their dogs long-term and those who have relinquished, which could ultimately make the CAES a more useful predictive tool in dog placements.

There is a great need for comprehensive longitudinal research in this field, which would assess the entire rehoming process from the point the dog arrives at the

shelter or rehoming organisation via any means (e.g. stray, owner relinquishment, transfer) until they are adopted and for several years beyond. However, this thesis highlights some of the challenges associated with this type of work. For dogs that are owner-relinquished behavioural histories should still be taken from the surrendering owner, not for the direct purpose of matching dogs to adopters or for risk assessment, but rather to use these to begin to evaluate the quality of owner reports in two ways: to evaluate whether the dog is displaying the same behavioural responses or patterns as were described in the reports while the dog is at the shelter pre-adoption, and whether those behavioural responses or patterns are continuing once the dog is adopted (i.e. do the surrendering owner reports have any predictive validity). Stephen and Ledger (2007) have evaluated the correlation between behaviours described in surrendering owner reports with reports provided by new owners; the authors report that there were significant correlations between some, but not all, types of behaviours. However, the study only followed-up with new owners two weeks and six weeks post-adoption, which may not be a long enough time period for a dog to adjust to their new environment and potentially display their full repertoire of behavioural responses. Dogs are at the greatest increased risk for relinquishment three months after they have been acquired, but remain at an increased risk for the first year after acquisition (New et al., 2000), so reports from new owners should be collected for at least one year post-adoption.

Some rehoming organisations do work toward building a profile of dogs pre-adoption, in addition to or in lieu of formal assessments. It is unlikely even with trained and/or experienced staff or volunteers that information gathered even in a less formal manner will be completely objective. Subjectivity is problematic in behavioural assessments (Chapter 3; Mornement et al., 2010), so one solution to this

might be to build a profile over time and involve the monitoring and observations by multiple staff or volunteers. By doing so over the entire period of time a dog is with the organisation until they are rehomed, the profiles would differ from formal assessments in that they are not a snapshot in time, but rather an ongoing observation of how a dog is existing in that environment. By monitoring the development of a dog's behaviour while they are with the organisation, factors such as those hypothesised to be aspects of behavioural flexibility in Chapter 5 (e.g. ability to occupy oneself) could become evident. Gathering information over time in this manner could also be useful for risk assessment. Rather than determining a dog is high risk or dangerous through a provocative formal assessment, which again is usually a snapshot in time, allowing a dog to be monitored over a longer duration of time for concerning behaviours may allow for more robust risk assessment. While shelters and rehoming organisations vary in their size (i.e. number of dogs and number of staff/volunteers) and in the amount of resources they have, moving away from traditional assessments could free resources to be able to monitor dogs over time in this manner. However, before or perhaps alongside implementation of such changes in protocol, it is important for the work to be supported by the aforementioned longitudinal research. In general shelters and rehoming organisations provide a great opportunity for research, which does not appear to be being capitalised on, to produce a more evidence based approach to rehoming. Other important aspects of the rehoming process that could be evaluated in this longitudinal research include whether conducting pre-adoption home visits are useful and whether pre-adoption dog training is beneficial. These two particular aspects have been highlighted as they are resource demanding. The overall goal of such longitudinal research would be to determine what factors, procedures, or

protocols are most advantageous to the success of the placement and most predictive of a successful relationship.

Conducting a longitudinal study of this magnitude would certainly have its challenges, namely achieving an adequate initial sample size to compensate for participant attrition over the course of the research. However, because shelters and rehoming organisations provide an excellent opportunity to conduct this sort of research, the first step in conducting such a study would be to build a network of these types of organisations that are willing to participate at the outset of the project is necessary. It is possible over the course of the project that not only will participants drop out, but entire organisations may as well, which is why having a network of them would be useful. There are two ways in which such longitudinal research could be conducted, each with slightly different aims, and thus different benefits, but both would follow dogs from their arrival at the organisation through several years post-adoption. The first option would involve following the same procedures (e.g. pre-adoption dog behaviour assessments) and collecting the same information from each procedure for the entire sample. However, because procedures and the types of information collected can vary widely from organisation to organisation (see Chapters 2 and 3), all participating organisations would need to follow a uniform protocol and collect the same information pre-adoption, so specific forms and questionnaires would need to be created for the purposes of the research. A key benefit of conducting a longitudinal study in this manner would be that the uniformity in procedures and information collected pre-adoption across organisations would potentially allow for ease in statistically assessing relationships between factors. Relationships involving very specific information could be investigated. For example, are dogs with a history of housetraining issues as

reported on surrendering owner forms less likely to remain in their new home long-term? While this type of longitudinal study would potentially yield some very interesting results, such as a wide range of risk factors for relinquishment, the second option for conducting a longitudinal study could yield broader results and be less resource demanding. As was demonstrated in Chapters 3 and 4, pre-adoption policies and procedures for dogs and potential adopters vary widely, and often are very resource demanding (e.g. conducting home visits for all potential adopters), yet there is a lack of scientific evidence to support the usefulness or necessity of these policies and procedures. Therefore, what would actually be more beneficial is to investigate this. In this case organisations would not need to follow uniform procedures, but rather they would continue following their usual protocols and collect the same types of information that they normally would. Relationships between more general factors could then be investigated. For example, are adopters who have adopted dogs who have undergone some type of pre-adoption behaviour assessment more likely to be satisfied with their dog immediately after adoption and then in the long-term? The results from this type of longitudinal study could provide evidence for the importance or usefulness of more general aspects of the dog rehoming process, such as if there is any significant relationship between conducting pre-adoption home visits and the success of the placement. This evidence could then prompt a shift in organisations' resources from resource-demanding pre-adoption procedures to post-adoption support (as discussed in Chapter 3).

Research is also needed to investigate what usefully qualifies as a successful dog-owner relationship. For the purposes of the current research, a successful placement was qualified by the owner's level of satisfaction with their dog, but this

is not the only aspect of a successful placement or successful relationship. Another way to qualify the success of the placement is whether or not the dog remains in the home, but this metric does not provide much information about the quality of the relationship, which may be important if the rehoming organisation claims to be a welfare organisation.

Because the dog-owner relationship is dynamic and involves two parties, both must be considered when evaluating its success. In the case of the adopter (or owner), their satisfaction with their relationship with their dog is key, as if they are unsatisfied they will probably be more likely to terminate the relationship. Assessing owner satisfaction can be relatively easily established through a questionnaire such as the one used in the current research (see subsection 4.2.5 of Chapter 4). Ideally, this would be reassessed at multiple points post-adoption, which is in keeping with the need for longitudinal research. However, an evaluation of an owner's satisfaction tells nothing about the success of the relationship or placement from the dog's perspective. One way to accomplish that would by using tool such as the *Adopted Dog Adaptation of Foster Placement Evaluation Scale (DPES)* that was developed in the current research (see subsection 4.2.1 of Chapter 4 and Appendix G) for the purpose of evaluating the placement of an adopted dog by a trained rater. This type of metric is somewhat more resource demanding than an owner satisfaction survey as it requires the rater to observe the placement in person, but it would allow for a more objective assessment of the placement and the relationship that focuses on the dog's well-being. What may be the most ideal way to evaluate the success of the relationship from the dog's perspective would be to develop a tool to assess a dog's quality of life. Developing such a tool would be resource demanding, but could provide a robust tool not only for evaluation of the

success of the placement, but also for determining what factors included in the adopter screening process are unnecessary. As was noted in Chapter 2, some of the factors organisations included in adopter screenings and/or as necessary criteria for an adopter to be deemed suitable or for the purpose of ensuring a dog has a good quality of life may not be valid. One way to develop a tool to assess a dog's quality of life would begin with an assessment of their needs and if they are being adequately met. Because a dog's needs are broad in scope and are prone to change over the course of their life, a tool that could differentiate between these needs is needed. This could be done by adapting a construct used to illustrate the tiers of human needs to be relevant to a dog's needs (e.g. Maslow's hierarchy of needs [Mills et al., 2013; Myers, 2001]). Future longitudinal research would ideally use all three metrics to evaluate the success of the placement and of the relationship (i.e. adopter satisfaction, an assessment of the placement by a trained rater, and an assessment of the dog's quality of life).

6.3. Recommendations for shelters and rehoming organisations

Shelters and rehoming organisations undoubtedly have limited resources, and some more so than others, so efficiency in the rehoming process should underpin all policies and procedures. As was discussed in Chapters 2 and 3, there is a deficit of scientific evidence to support many organisations' practices, and a lack of scientific rigour in their execution. As such, an initial step in improving efficiency is for organisations to keep thorough records and follow-up data. By doing this, they can begin to see which practices are beneficial and which ones are of little or no benefit. For example, if an organisation only conducts pre-adoption home visits for some dogs, but in comparing return rates for dogs who had them with dogs that did not have them, they realise that there is no difference in return

rates, then it does not make sense to waste resources on conducting any pre-adoption home visits as part of their rehoming process. Such information could easily be attained and evaluated through thorough record keeping. It would also make sense to reconsider necessary criteria for adoption (for those organisations that have it), as much of such criteria are not recognised as risk factors for relinquishment or related to the risk posed by the dog; by having unnecessary requirements potentially suitable homes are being turned away. It seems of greater benefit to the success of the placement to focus on assessing adopters, though a shift away from an emphasis on static features of adopters is needed, as they are prone to change over the lifetime of the dog and many are not risk factors for relinquishment anyway.

While internal record keeping is a good starting point for rehoming organisations to improve their efficiency, while not sacrificing the quality of the rehoming process, organisations need to be able to access the current research being conducted in the field. With the exception of maybe larger organisations with a dedicated research and development department (e.g. Dogs Trust, the ASPCA), it is unlikely that staff or volunteers from organisations are going to read studies in academic journals. There needs to be a clear and accessible pathway or bridge between the research and organisations so that such information can be easily disseminated and understood. The ASPCA offers an easily accessible tool of this sort, ASPCApro (www.aspcapro.org), but the research included on the site tends to focus on that which has been conducted by the organisation itself. While this tool is a step in the right direction, a better option would be a more objective resource that includes research conducted across the field, and summarises useful results (e.g. statistically significant risk factors for relinquishment), not just descriptive summaries.

Until more comprehensive research has been conducted on the rehoming process and there is further research on what adopter assessments should be comprised of, organisations should perhaps prioritise their resources towards post-adoption follow-up and support, as there is evidence for the importance of that in both the results of the current research (i.e. dog relinquishers showing less flexibility in their expectations of dog behaviour), and other studies (Diesel et al., 2008; Patronek et al., 1996) that have reported that post-adoption support is associated with a decreased risk for relinquishment.

There is undoubtedly a growing interest in both improving dog rehoming practices and addressing the overall international problem of homeless or unwanted dogs. These interests are evidenced by the expanding research attention that has been given to the field, movements and laws enacted to decrease the numbers of homeless dogs euthanized due to limited resources for their care, and by the responses received from rehoming organisations and their willingness to participate in the current research. The field has progressed considerably from decades ago, but the demand to do better and improve the welfare of homeless dogs is rightfully still present; robust and rigorous research, especially longitudinal research, and a means for organisations to easily access the results of such research is needed to bridge the gap between the science and the practical application.

Appendix A

Written enquiry sent to rehoming organisations regarding their adopter screening policies and procedures

Dear _____,

I am a PhD student in animal welfare at the University of Lincoln working under the supervision of Professor Daniel Mills and colleagues. I am researching dogs' ability to fit into a home environment, and how this affects their success at being rehomed. As an initial step I would like to identify current rehoming procedures in order to gain insight into the criteria on which placements are made, such as which characteristics of both the dog and potential adopter are given the most weight during the screening process. One of the goals of my research is to increase the number of dogs who are successfully rehomed, and thus to decrease the number of dogs relinquished. Therefore, I am writing to you to inquire about *(the organization)*'s practices or policies concerning screening potential adopters. If you are able to address the following questions it would be much appreciated:

1. Do you have standardized questionnaires or criteria employed across the organization for the adoption process, or do they vary from location to location? If you have a generic document, would you be willing to please send me a copy of it? Alternatively, if you have local procedures, would you please put me in touch with the relevant local contacts?
2. Do you conduct an interview with potential adopters or do they only complete a form that gathers their information? If you conduct an interview, what questions do you ask, and are they consistent from adoption to adoption?
3. How do you judge or score the responses given either via a questionnaire or interview? For example, are the responses to some questions given more value than others, such as the amount of time that an adopter is away from home during the day, or if they live in an apartment versus a house with a garden? Please provide as much detail as you can.
4. Do you require that you meet all members of the adopter's family who will be living with the dog, or at least have some form of contact with them? If so, for what purpose?
5. Do you conduct a home visit prior to adoption? If so, are there specific criteria that must be met in order for an adoption to be approved? What are the details of this please?

If you have any queries about the nature of this work, you may contact my supervisor (dmills@lincoln.ac.uk) if you wish, but please do not hesitate to contact me at the address above or via e-mail (kgriffin@lincoln.ac.uk) if you have any specific questions about the information I am seeking. If you would like to forward any supplemental material or give any additional information, you are more than welcome to, either electronically or via the post. Additionally, if you would prefer

to discuss anything over the telephone, please let me know the best number at which to contact you. Thank you in advance for your participation in gathering this information.

Additionally, I am looking to form a panel of experts in the field of animal rescue who would be interested in giving input and feedback on the creation of measures to be used in the rehoming process. If there is anybody you know of, or would like to recommend to be a part of this, would you please let me know?

Yours sincerely,
Karen Griffin
University of Lincoln
School of Life Sciences
Riseholme Park
Lincoln
LN2 2LG

Appendix B

Written enquiry sent to rehoming organisations regarding their pre-adoption dog screening policies and procedures

Hello,
I am a PhD student in animal welfare at the University of Lincoln working under the supervision of Professor Daniel Mills and colleagues. I am researching dogs' ability to fit into a home environment, and how this affects their success at being rehomed. As part of this research, I would like to identify the types of information that is aimed to be gathered from any pre-adoption assessments of dogs (e.g. temperament, personality, behavioural characteristics/traits).

One of the primary goals of my research is to increase the number of dogs who are successfully rehomed, and thus to decrease the number of dogs relinquished. Therefore, I am writing to you to inquire about the organization's practices or policies concerning assessing dogs prior to adoption. If you are able to address the questions below it would be much appreciated.

If you have any queries about the nature of this work, you may contact my supervisor (dmills@lincoln.ac.uk) if you wish, but please do not hesitate to contact me via e-mail (kgriffin@lincoln.ac.uk) if you have any specific questions about the information I am seeking. If you would like to forward any supplemental material or give any additional information, you are more than welcome to, either electronically or via the post. Additionally, if you would prefer to discuss anything over the telephone, please let me know the best number at which to contact you. Thank you in advance for your participation in gathering this information.

Yours sincerely,
Karen Griffin
University of Lincoln
School of Life Sciences
Joseph Banks Laboratories
Lincoln
LN6 7DL

1. Do you assess the dogs in any manner prior to adoption, such as in terms of their temperament, personality, or behavioural characteristics?

2. If yes, are all dogs that are part of the organization assessed?

3. If no, why not?

4. Is there a form or document that is completed as a part of the assessment?

5. If yes, would you be willing to please send me a copy of it (preferably via email or to the above postal address)?

6. What information about the dog (e.g. specific behaviours, personality characteristics, etc.) are you aiming to gather from the assessment? Please provide as much detail as possible.

7. Are any aspects of the assessment given more weight or value than others?

8. If yes, what are they?

9. Would any results attained from the assessment result in a dog being deemed unadoptable?

10. If yes, what are they? Please provide as much detail as possible.

11. Is there anything else about the assessments of dogs conducted in your organization that you would like to add?

Appendix C

Dimensions of Temperament Survey – Revised Adult (DOTS-R Adult)
(Doelling, 1989; Windle & Lerner, 1986)

INSTRUCTIONS: Below are statements about one's behavior. Some of the statements may be true of your own behavior, and others may not apply to you. For each statement, please indicate if each statement is usually true of you, is more true than false of you, is more false than true of you, or is usually false of you. On the line following each statement, write the corresponding letter to what applies to you:

A: the statement is usually FALSE for you
B: the statement is more FALSE than TRUE for you
C: the statement is more TRUE than FALSE for you
D: the statement is usually TRUE for you

There are no "right" or "wrong" answers, just answer what is true for *you*.

1. It takes me a long time to get used to a new thing in the home. _____
2. I can't stay still for long. _____
3. I laugh and smile at a lot of things. _____
4. I wake up at different times. _____
5. Once I am involved in a task, nothing can distract me. _____
6. I persist at a task until it's finished. _____
7. I move around a lot. _____
8. I can make myself at home anywhere. _____
9. I can always be distracted by something else, no matter what I may be doing. _____
10. I stay with an activity for a long time. _____
11. If I have to stay in one place for a long time, I get very restless. _____
12. I usually move toward new objects shown to me. _____
13. It takes me a long time to adjust to new schedules. _____
14. I do not laugh or smile at many things. _____
15. If I am doing one thing, something else occurring won't get me to stop. _____
16. I eat about the same amount for dinner whether I am home, visiting someone, or traveling. _____
17. My first reaction is to reject something new or unfamiliar to me. _____
18. Changes in plans always make me restless. _____
19. I often stay still for long periods of time. _____
20. Things going on around me cannot take me away from what I am doing. _____
21. I take a nap, rest or break at the same time every day. _____
22. Once I take something up, I stay with it. _____
23. Even when I am supposed to be still, I get very fidgety after a few minutes. _____
24. I am hard to distract. _____
25. I usually get about the same amount of sleep each night. _____

26. On meeting a new person I tend to move towards him or her. _____
27. I get hungry about the same time each day. _____
28. I smile often. _____
29. I never seem to stop moving. _____
30. It takes me no time at all to get used to new people. _____
31. I usually eat the same amount each day. _____
32. I move a great deal in my sleep. _____
33. I seem to get sleepy at just about the same time every night. _____
34. I do not find that I laugh often. _____
35. I move towards new situations. _____
36. When I am away from home I still wake up at the same time each morning. _____
37. I eat about the same amount for breakfast from day to day. _____
38. I move a lot in bed. _____
39. I feel full of pep and energy at the same time each day. _____
40. I have bowel movements at about the same time each day. _____
41. No matter when I go to sleep, I wake up at the same time the next morning. _____
42. In the morning, I am still in the same place as I was when I fell asleep. _____
43. I eat about the same amount at supper from day to day. _____
44. When things are out of place, it takes me a long time to get used to it. _____
45. I wake up at the same time on weekends and holidays as on other days of the week. _____
46. I don't move around much at all in my sleep. _____
47. My appetite seems to stay the same day after day. _____
48. My mood is generally cheerful. _____
49. I resist changes in routine. _____
50. I laugh several times a day. _____
51. My first response to anything new is to move my head toward it. _____
52. Generally I am happy. _____
53. The number of times I have a bowel movement on any day varies from day to day. _____
54. I never seem to be in the same place for long. _____

Appendix D

Dimensions of Temperament Survey – Revised Child Expectations (DOTS-R Child Expectations)
(Doelling, 1989; Doelling & Johnson, 1990)

How to answer: On the following pages are some statements about how you would expect children to behave. For each statement we would like you to indicate if the statement is mostly true of what you would expect of children, is more true than false of what you would expect, is more false than true of what you expect, or is mostly false of what you expect. There are no "right" or "wrong" answers. Just answer what you expect of children's behaviour.

A: the statement is usually FALSE for you
B: the statement is more FALSE than TRUE for you
C: the statement is more TRUE than FALSE for you
D: the statement is usually TRUE for you

1. I expect that it will take a child a long time to get used to a new thing in the home.
2. I expect that a child won't be able to stay still for long.
3. I expect a child to laugh and smile at a lot of things.
4. I expect a child to wake up at different times.
5. Once a child is involved in a task, I expect nothing will distract him or her from it.
6. I expect a child to persist at a task until it's finished.
7. I expect a child to move around a lot.
8. I expect a child to make him/herself at home anywhere.
9. I expect a child will always be distracted by something else, no matter what he or she may be doing.
10. I expect a child to stay with an activity for a long time.
11. If a child has to stay in one place for a long time, I expect he/she to get very restless.
12. I expect a child to move toward new objects shown to him/her.
13. I expect a child to take a long time to adjust to new schedules.
14. I expect a child will not laugh or smile at many things.
15. If a child is doing one thing, I expect that something else occurring won't get him/her to stop.
16. I expect a child to eat about the same amount of dinner whether he/she is home, visiting someone, or traveling.
17. I expect a child's first reaction to be to reject something new or unfamiliar to him/her.
18. I expect that changes in plans will make a child restless.
19. I expect a child to often stay still for long periods of time.
20. I expect that things going on around a child will not take him/her away from what he/she is doing.
21. I expect a child to take a nap, rest, or break at the same times every day.

22. Once a child takes something up, I expect he/she to stay with it.
23. Even when a child is supposed to be still, I expect he/she to get very fidgety after a few minutes.
24. I expect a child to be hard to distract.
25. I expect a child to usually get the same amount of sleep each night.
26. On meeting a new person I expect a child to tend to move toward him or her.
27. I expect a child to get hungry about the same time each day.
28. I expect a child to smile often.
29. I expect a child to never seem to stop moving.
30. I expect it will take a child no time at all to get used to new people.
31. I expect a child to usually eat the same amount each day.
32. I expect a child to move a great deal in his/her sleep.
33. I expect a child to get sleepy just about the same time every night.
34. I expect not to find a child laughing often.
35. I expect a child to move toward new situations.
36. When a child is away from home, I expect he/she will still wake up at the same time each morning.
37. I expect a child will eat about the same amount at breakfast from day to day.
38. I expect a child to move a lot in bed.
39. I expect a child to feel full of pep and energy at the same time each day.
40. I expect a child to have bowel movements at about the same time each day.
41. No matter when a child goes to sleep, I expect him/her to wake up at the same time the next morning.
42. In the morning, I expect a child to still be in the same place as he/she was when he/she fell asleep.
43. I expect a child to eat at about the same amount of supper from day to day.
44. When things are out of place, I expect it will take a child a long time to get used to it.
45. I expect a child to wake up at the same time on weekends and holidays as on other days of the week.
46. I expect a child to not move around much at all in his/her sleep.
47. I expect a child's appetite to stay the same day after day.
48. I expect a child's mood to be generally cheerful.
49. I expect a child to resist changes in routine.
50. I expect a child to laugh several times a day.
51. I expect a child's first response to anything new to be to move his/her head toward it.
52. I expect a child to be generally happy.
53. I expect the number of times a child has a bowel movement on any day will vary from day to day.
54. I expect a child will never be in the same place for long.

Appendix E

Canine Adopter Expectations Survey (CAES)

INSTRUCTIONS: Below are statements about how one might *expect* a dog to behave. For each statement, please indicate if each statement is mostly true of what you expect of a dog, is more true than false than what you expect, is more false than true of what you expect, or is mostly false of what you expect. On the line following each statement, write the corresponding letter to what you expect of a dog:

A: the statement is mostly FALSE of what you expect
B: the statement is more FALSE than TRUE of what you expect
C: the statement is more TRUE than FALSE of what you expect
D: the statement is mostly TRUE of what you expect

There are no "right" or "wrong" answers, just answer what you expect of a dog's behaivour.

1. I expect that a dog may have difficulty adapting to a novel thing in the home, such as a new baby, building works, or redecoration. _____
2. I expect that a dog may not be able to stay calm for long periods of time. _____
3. I expect a dog to wag his or her tail and show excitement at a lot of things. _____
4. I expect a dog to bark and disturb me sometimes. _____
5. Once a dog is involved in a task, I expect nothing will distract him or her from it. _____
6. I expect a dog to persist at a task until it's finished. _____
7. I expect a dog to move around a lot. _____
8. I expect a dog to make him/herself comfortable all around the home. _____
9. I expect that it will be easy for a dog to get distracted by something else. _____
10. I expect a dog to be able to stay with an activity for a long time. _____
11. I expect that a dog may get restless if required to stay settled for a long time. _____
12. I expect a dog to show interest in new things in the environment. _____
13. I expect a dog to take a long time to adjust to changes in his/her schedule or to other individuals' schedules. _____
14. I expect a dog will not wag his or her tail or show excitement at many things. _____
15. If a dog is doing something, I expect that something else occurring won't get him/her to stop. _____
16. I expect a dog to usually have a consistent appetite at or away from home. _____
17. I expect a dog to initially avoid something new or unfamiliar to him/her. _____
18. I expect that changes in routine or environment will make a dog stressed. _____

19. I expect a dog to often stay still for long periods of time. _____
20. I expect that things going on around a dog will not stop him/her from carrying on with what he/she is doing. _____
21. I expect a dog to rest at the same times every day. _____
22. When a dog starts to do something determinedly, I expect him/her to be difficult to interrupt from doing this. _____
23. Even when I want a dog to be calm, I expect that a dog will soon get restless. _____
24. I expect that it will be hard to distract a dog. _____
25. I expect a dog's sleeping patterns to be consistent. _____
26. On meeting a new person or animal I expect a dog to tend to move toward him or her. _____
27. I expect a dog to anticipate mealtimes at the same time each day. _____
28. I expect a dog to show he/she is happy a lot of the time. _____
29. I expect a dog to never seem to stop moving. _____
30. I expect it will take a dog no time at all to get used to new people. _____
31. I expect a dog to usually eat the same amount each day if fed their usual food. _____
32. I expect a dog to change his/her position during sleep. _____
33. I expect a dog to get sleepy just about the same time every night. _____
34. I expect not to find a dog wagging his/her tail and showing excitement often. _____
35. I expect a dog to move toward new situations. _____
36. When a dog is away from home, I expect he/she will still wake up at the same time each morning. _____
37. I expect a dog will usually eat about the same amount at meals. _____
38. I expect a dog will change his/her position in bed a lot. _____
39. I expect a dog to be full of pep and energy at the same time each day. _____
40. I expect a dog to have to relieve him/herself at about the same time each day. _____
41. No matter when a dog goes to sleep, I expect him/her to wake up at the same time the next morning. _____
42. In the morning, I expect a dog to be where I left him/her the night before. _____
43. I expect a dog to eat about the same amount at meals each day. _____
44. I expect it will take a dog a long time for him/her to get used to things being moved to new locations around the home. _____
45. I expect a dog to wake up at the same time on weekends and holidays as on other days of the week. _____
46. I expect a dog to not move around much at all in his/her sleep. _____
47. I expect a dog's appetite to stay the same day after day. _____
48. I expect a dog to generally be in a good mood. _____
49. I expect a dog to not easily adapt to changes in routine. _____
50. I expect a dog to show signs of happiness several times a day. _____
51. I expect a dog's first response to anything new to be to investigate it. _____
52. I expect a dog to be generally happy. _____
53. I expect the number of times a dog has to relieve him/herself on any day will vary from day to day. _____
54. I expect a dog to be constantly moving about when they are awake. _____

Appendix F

Foster Placement Evaluation Scale
(Doelling, 1989; Doelling & Johnson, 1990)

The following is a list of statements pertaining to various aspects of foster care placements. Please read each item, decide how descriptive that statements is of this particular placement and circle the appropriate number. Thank you for your help.

1 = strongly disagree
2 = slightly disagree
3 = neither agree nor disagree
4 = slightly agree
5 = strongly agree

1. The foster parent(s) spends an adequate amount of time with the child in fun activities. 1 2 3 4 5

2. The foster parent(s) treats the child equally well to the other children in the home. 1 2 3 4 5

3. There is ample affection shown between the foster mother and the child. 1 2 3 4 5

4. There is ample affection shown between the foster father and the child. 1 2 3 4 5

5. The child seems to enjoy spending time with the other children in the home. 1 2 3 4 5

6. The foster parent(s) adequately takes care of the medical and other needs of the child (food, clothing, other appts., etc.) 1 2 3 4 5

7. The foster parent(s) is able to deal effectively with difficult behaviors the child exhibits. 1 2 3 4 5

8. The foster parent(s) shows an attitude of acceptance toward the child regardless of his/her behaviour. 1 2 3 4 5

9. The child seems to have adapted well to the family structure. 1 2 3 4 5

10. The foster parent(s) is receptive to and aware of the child's individual needs. 1 2 3 4 5

Appendix G

Dog Adaptation of Foster Placement Evaluation Scale (DPES)

1. The owner spends an adequate amount of time engaging in activities during which the dog shows signs of enjoyment or excitement.
   1 = strongly agree (owner spends multiple periods of time everyday engaging in such activities)
   2 = slightly agree (owner spends some time daily engaging in such activities)
   3 = neither agree nor disagree (owner spends adequate time engaging in such activities)
   4 = slightly disagree (owner spends below adequate time engaging in such activities)
   5 = strongly disagree (owner spends no time engaging in such activities)

2. The owner treats all dogs in the house equally well.
   1 = strongly agree (the owner treats all dogs equally well all of the time)
   2 = slightly agree (the owner treats the dogs equally well most of the time)
   3 = neither agree nor disagree (the owner treats the dogs equally well some of the time)
   4 = slightly disagree (the owner occasionally treats the dogs equally well)
   5 = strongly disagree (the owner does not treat the dogs equally well)

3. There is ample affection shown between the owner and the dog.
   1 = strongly agree (there is ample affection shown between the owner and the dog all of the time)
   2 = slightly agree (there is some affection shown between the owner and dog most of the time)
   3 = neither agree nor disagree (there is sufficient affection shown between the owner and the dog some of the time)
   4 = slightly disagree (there is rarely affection shown between the owner and the dog)
   5 = strongly disagree (there is never affection shown between the owner and the dog)

4. There is ample affection shown between all other family members who have dog-related responsibilities and the dog.
   1 = strongly agree (there is ample affection shown between all other family members who have dog-related responsibilities and the dog all of the time)
   2 = slightly agree (there is some affection shown between all other family members who have dog-related responsibilities and dog most of the time)
   3 = neither agree nor disagree (there is sufficient affection shown between some other family members who have dog-related responsibilities and the dog some of the time)
   4 = slightly disagree (there is rarely affection shown between other family members who have dog-related responsibilities and the dog)

5 = strongly disagree (there is never affection shown between other family members who have dog-related responsibilities and the dog)

5. The dog seems to enjoy spending time with others in the home.
   1 = strongly agree (the dog seems to enjoy spending time with others in the home all of the time)
   2 = slightly agree (the dog seems to enjoy spending time with others in the home most of the time)
   3 = neither agree nor disagree (the dog seems to enjoy spending time with others in the home some of the time)
   4 = slightly disagree (the dog seems to enjoy spending time with others in the home rarely)
   5 = strongly disagree (the dog never seems to enjoy spending time with others in the home)

6. The owner adequately takes care of the medical and other needs of the dog (e.g. food, exercise, etc.).
   1 = strongly agree (the owner always adequately takes care of the medical and other needs of the dog)
   2 = slightly agree (the owner adequately takes care of the medical and other needs of the dog most of the time)
   3 = neither agree nor disagree
   4 = slightly disagree (the owner adequately takes care of the medical and other needs of the dog sometimes)
   5 = strongly disagree (the owner does not adequately take care of the medical and other needs of the dog)

7. The owner is able to deal effectively with the difficult behaviours the dog exhibits.
   1 = strongly agree (the owner deals effectively with the difficult behaviours the dog exhibits the all of the time)
   2 = slightly agree (the owner deals effectively with the difficult behaviours the dog exhibits most of the time)
   3 = neither agree nor disagree (the owner deals effectively with the difficult behaviours the dog exhibits some of the time)
   4 = slightly disagree (the owner rarely deals effectively with the difficult behaviours the dog exhibits)
   5 = strongly disagree (the owner never deals effectively with the difficult behaviours the dog exhibits)

8. The owner shows an attitude of acceptance toward the dog regardless of his/her behaviour.
   1 = strongly agree (the owner shows an attitude of acceptance all of the time)
   2 = slightly agree (the owner shows an attitude of acceptance most of the time)
   3 = neither agree nor disagree (the owner shows an attitude of acceptance some of the time)
   4 = slightly disagree (the owner rarely shows an attitude of acceptance)
   5 = strongly disagree (the owner never shows an attitude of acceptance)

9. The dog seems to have adapted well to the home environment, including the family situation.
   1 = strongly agree (the dog seems to have adapted well all of the time)
   2 = slightly agree (the dog seems well adapted most of the time)
   3 = neither agree nor disagree (the dog seems to have adapted well some of the time)
   4 = slightly disagree (the dog shows little adaptation to home environment)
   5 = strongly disagree (the dog seems to not have adapted at all)

10. The owner is receptive to and aware of the dog's individual needs.
    1 = strongly agree (the owner is receptive to and aware of the dog's individual needs all of the time)
    2 = slightly agree (the owner is receptive to and aware of the dog's individual needs most of the time)
    3 = neither agree nor disagree (the owner is receptive to and aware of the dog's individual needs some of the time)
    4 = slightly disagree (the owner is rarely receptive to and aware of the dog's individual needs)
    5 = strongly disagree (the owner is never receptive to and aware of the dog's individual needs)

11. The owner is aware of how the dog signals his/her needs.
    1 = strongly agree (the owner is aware of how the dog signals all of his/her needs)
    2 = slightly agree (the owner is aware of how the dog signals most of his/her needs)
    3 = neither agree nor disagree (the owner is aware of how dog signals some of his/her needs)
    4 = slightly disagree (the owner is aware of how the dog signals one of his/her needs)
    5 = strongly disagree (the owner is not aware of how the dog signals any of his/her needs)

12. The dog shows interest in other family members living in the house (children, grandparents, etc.).
    1 = strongly agree (the dog shows interest in other family members living in the house all of the time)
    2 = slightly agree (the dog shows interest in other family members living in the house most of the time)
    3 = neither agree nor disagree (the dog shows interest in other family members living in the house some of the time)
    4 = slightly disagree (the dog shows interest in other family members living in the house rarely)
    5 = strongly disagree (the dog never shows any interest in other individuals in the house)

Appendix H

Informed consent by long-term dog owners for survey participation
(participation completed electronically via Qualtrics)

The purpose of this research is to examine factors that lead to people keeping their dogs, rather than relinquishing them. (In this context, relinquishment of a dog refers to the voluntary surrendering or giving up of a pet dog to another individual, party, or organization.) This research is looking to recruit people who have owned a pet dog for a minimum of three years. The participant must have been at least 18 years old when the dog was acquired, and the dog must have lived with the participant for the duration of the ownership.

In order to investigate these factors, measures created by Windle & Lerner (1986) and Doelling & Johnson (1990) have been adapted from their original purpose of placing human foster children with families to be relevant to the dog-owner relationship. As such, some of the items included in the questionnaires may seem unusual or irrelevant, but since they have been validated in their original context, all items are being included at this stage in the current study. However, one of the aims of this research is to determine which items are necessary and which items can be omitted without affecting the validity of the adapted measures. Participation in this research would involve the completion of two questionnaire-style surveys as described above, a form to gather data about the participant and the dog, and a brief survey regarding how you feel about your relationship with your dog. Participants will be contacted via email to retake these surveys on two additional occasions: two weeks after the initial completion and three months after the initial completion. Participation is completely voluntary, and all data will be stored in accordance with the Data Protection Act and associated requirements.

This project aims to have significant practical applications, such as to create an accessible and easily administrable measure to be employed at rescue centres and other such organizations during the rehoming process, to identify different at-risk adopters, so that limited resources can be focused more effectively in providing support where necessary. Therefore, it has the potential to greatly aid the efficiency of finding appropriate homes for dogs in the future. By taking part in this study as described above, you are acknowledging that you have fully read and understand the nature of this research, and you are consenting to participate.

Appendix I

Long-term dog owner demographic data questionnaire
(participation completed electronically via Qualtrics)

1. In what country to do you reside? *(drop down menu)*

2. What is your date of birth? *(fill in)*

3. What is your gender? (*male/female)*

4. Are you the primary decision maker of the household? The primary decision maker refers to the individual in the household who takes on the primary role as the important decision maker for the family and its lifestyle (e.g. where to send children to school, what house to buy, etc.)? *(yes/no)*

5. Have you ever been diagnosed by a medical doctor or mental health professional as having an attentional disorder, a stress disorder, an emotional disorder, an affective disorder, a psychotic disorder, or an eating disorder? *(yes/no/unsure/prefer not to answer)*

6. Have you owned a pet dog for a minimum of three years? *(yes/no)*

* If you have owned more than one dog for a minimum of three years, please refer to the dog you have owned the longest to answer these questions, choosing the one you know the best if you have owned more than one for the exact same amount of time.

7. Were you at least 18 years old when the dog was acquired? *(yes/no)*

8. Has the dog lived with you for the entire duration of the time since you acquired him or her? *(yes/no)*

9. What was the age or estimated age of the dog at the time you acquired him or her (please be as specific as possible)? *(number of years/months)*

10. How much does the dog weigh (please indicate the dog's weight as an adult if he or she was acquired as a puppy)? *(up to 25 lbs. [11 kg]/26-60 lbs. [12-27 kg]/61-100 lbs. [28-45 kg]/101 lbs. [46 kg] or more)*

11. From where did you acquire the dog? *(breeder/pet store/rescue group, animal shelter, rescue centre/gift from another individual/purchase from another person/found as stray/other)*

Appendix J

Informed consent by dog relinquishers for survey participation
(participation completed electronically via Qualtrics)

The purpose of this research is to examine factors that lead to people relinquishing their dogs. This research is looking to recruit people who have relinquished a dog in the past. In this context, relinquishment of a dog refers to the voluntary surrendering or giving up of a pet dog to another individual, party, or organization.

In order to investigate these factors, measures created by Windle & Lerner (1986) and Doelling & Johnson (1990) have been adapted from their original purpose of placing human foster children with families to be relevant to the dog-owner relationship. As such, some of the items included in the questionnaires may seem unusual or irrelevant, but since they have been validated in their original context, all items are being included at this stage in the current study. However, one of the aims of this research is to determine which items are necessary and which items can be omitted without affecting the validity of the adapted measures. Participation in this research would involve the anonymous completion of two questionnaire-style surveys as described above, and a form to gather data about the participant and the relinquished dog. Participants will be given the opportunity to provide their email address at the end of the surveys if they are willing to be contacted for a future study, although this is not mandatory. Participation is completely voluntary, and all data will be stored in accordance with the Data Protection Act and associated requirements.

This project aims to have significant practical applications, such as to create an accessible and easily administrable measure to be employed at rescue centres and other such organizations during the rehoming process, to identify different at-risk adopters, so that limited resources can be focused more effectively in providing support where necessary. Therefore, it has the potential to greatly aid the efficiency of finding appropriate homes for dogs in the future. In order to participate in this research, you must have relinquished a dog. By taking part in this study as described above, you are acknowledging that you have fully read and understand the nature of this research, and you are consenting to participate.

Appendix K

Dog relinquisher demographic data questionnaire
(participation completed electronically via Qualtrics)

1. In what country to you reside? *(drop down menu)*

2. What is your date of birth? *(fill in)*

3. What is your gender? *(male/female)*

4. Are you the primary decision maker of the household? The primary decision maker refers to the individual in the household who takes on the primary role as the important decision maker for the family and its lifestyle (e.g. where to send children to school, what house to buy, etc.)? *(yes/no)*

5. Have you ever been diagnosed by a medical doctor or mental health professional as having an attentional disorder, a stress disorder, an emotional disorder, an affective disorder, a psychotic disorder, or an eating disorder? (yes/no/unsure/prefer not to answer)

6. Have you relinquished a dog? *(yes/no)*

    7. Have you relinquished more than one dog? *(yes/no)*

    8. How many dogs have you relinquished in total? *(select 1-10 or more)*

    9. Did you relinquish them all at one time? *(yes/no)*

    10. How many separate times have you relinquished a dog? *(select 2-10 or more)*

* If you have relinquished more than one dog, please refer to the one most recently relinquished to answer the following questions, choosing the one you knew best if more than one relinquished at this time.

11. How long ago did you relinquish the dog? *(number of years/months)*

12. What was the age or estimated age of the dog at the time of relinquishment? *(number of years/months)*

12. How much did the dog weigh? *(up to 25 lbs. [11 kg]/26-60 lbs. [12-27 kg]/61-100 lbs. [28-45 kg]/101 lbs. [46 kg] or more)*

13. How long did the dog live with you prior to relinquishment (please be as precise as possible)? *(number of years/months)*

14. From where did you acquire the dog? *(breeder/pet store/rescue group, animal shelter, rescue centre/gift from another individual/purchase from another person/found as stray/other)*

15. Why did you relinquish the dog? *(moving process considered to much for dog/landlord does not allow dog/too many animals in household/cost of dog maintenance was too high/dog became ill/pressure for euthanasia otherwise/could not care for dog due to family illness/health issue of self or another person in household affected by the presence of the dog/change in family structure/not enough time for dog/problematic behaviours/other characteristics of dog/other)*

    16. Problematic behaviours (tick all that apply): *(unwanted barking/unwanted chewing, destructive behaviour/too active/elimination behaviour/aggressive behaviour toward another animal/aggressive behaviour toward people/disobedient/escaped/separation problems/escaped)*

17. When you relinquished the dog, did you have other dog(s) in the household that you did not relinquish and remained in your household? *(yes/no)*

18. Was the relinquished dog your first dog as an adult (i.e. since being 18 years or older at the time the dog was acquired)? *(yes/no)*

19. Do you currently have a dog(s) in your household? *(yes/no)*

Appendix L

Informed consent by dog adopters

I, (your name)_____, confirm that I am over 18 years old and hereby give consent to participate in the study entitled, "The Role of Behavioural Flexibility in the Success of Shelter Dog Rehoming" being conducted by Karen Griffin, approved by the relevant ethics committee of The University of Lincoln.

The purpose of this study is to examine factors that affect the success of shelter dog placements. In order to do this, measures have been adapted from their original purpose of placing human foster children with families to be relevant to the dog-owner relationship. As such, some of the items included in the questionnaires may seem unusual or irrelevant, but since they have been validated in their original context, all items must be included. However, one of the aims of this research is to determine which items are necessary and which items can be omitted without affecting the validity of the adapted measures. The practical application of this project is to use the results of the research to develop a standardized, easily administrable method to be used in the rehoming process in order to maximize the likelihood of a successful dog-adopter pairing.

I understand that my role in the study will be: to complete two questionnaires at the point of adoption and a further two questionnaires six months post-adoption.
I am freely supplying information about myself and the dog that I am adopting, and my contact information including postal address, phone number, and email address for this purpose and agree to be contacted by the researchers involved in this project accordingly. If I am unable to provide the requested information about the dog that I am adopting, I understand that the researchers will acquire this information from the organization from which I am adopting the dog. The principal investigator will send the questionnaires to me via post or email six months post-adoption, and to the best of my ability I will try to return these as and when requested.

I understand that my personal data will be anonymized once it has been collected and I will not be identified or identifiable in any publication resulting from the work. All data will be stored in accordance with the Data Protection Act and associated requirements

I will follow the principal investigator's instructions to the best of my ability, but I am aware that I have the right to withdraw from the study at any time without giving notice or reason.

I agree that data collected from the responses that I have supplied can be used for academic purposes as deemed appropriate by the researchers involved in the study.

Date_____
Full name_____
Signature_____

Appendix M

Dog adopter demographic data questionnaire

The adopter:
Full name:
_____

E-mail address:
_____

Postal/mailing address (house number, street, city, state, zip code):
_____
_____
_____

What is your date of birth (day/month/year)? ____/____/____

What is your gender? ☐male ☐female

Are you the primary decision maker of the household? The *primary decision maker* refers to the individual in the household who takes on the primary role as the important decision maker for the family and its lifestyle (e.g. where to send children to school, what house to buy, etc.)?
☐yes ☐no

Do you have other dogs currently living in the household? ☐yes ☐no
If yes, how many do you have? _____
Please list how long you have had each of the **other** dogs:
Dog 1: ____years ____months
Dog 2: ____years ____months
Dog 3: ____years ____months
Dog 4: ____years ____months

The dog:
What is the age or estimated age of the dog you are currently adopting?
____years ____months

How much does the dog weigh?
☐up to 25 lbs. (11 kg)
☐26-60 lbs. (12-27 kg)
☐61-100 lbs. (28-45 kg)
☐101 lbs. (46 kg) or more

What is the dog's sex? ☐male ☐female

Appendix N

Ethograms of behaviours displayed in dog tests

L-shaped food finding test (Q6):

- ☐ Barking
- ☐ Panting
- ☐ Growling
- ☐ Whining
- ☐ Attempting to break through gate
- ☐ Scratching/digging at floor or enclosure walls
- ☐ Other_____
- ☐ None of these behaviours

Three-toy test (Q3) and Pointing test (Q2, Q8, Q14, Q19):

- ☐ Barking
- ☐ Panting
- ☐ Growling
- ☐ Whining
- ☐ Scratching/digging at floor or walls
- ☐ Looking/gazing at tester
- ☐ Other_____
- ☐ None of these behaviours

Appendix O

Piloting of dog tests

Once the tests were created, volunteers' dogs (n=12) of various ages, sizes, breeds, levels of training, and backgrounds (e.g. breeder vs. shelter dog) were recruited to pilot the tests. Piloting of the battery of tests took place using the convenience samples of colleagues' and friends' dogs in two phases. The very diverse sample of dogs used for the first piloting phase in particular brought to light necessary adjustments that needed to be done to the tests prior to their administration. This phase of piloting raised questions about which aspects of dogs' behaviour during the tests are meaningful and compared between participants (e.g. in the Left alone test does the dog stay oriented toward the door when the person leaves?), and which are merely artefacts that do not need to be given further consideration. Questions were also raised as to how to assess the meaningful behaviours (e.g. should the L-shaped food finding test be timed?). After this phase, the logistics of test administration and what would be needed to perform the tests were addressed (e.g. the building of a testing structure for the L-shaped food finding test). Once this was done and necessary materials were readied, a second phase of piloting took place to more accurately assess feasibility of administration. Feasibility of administration was of particular importance as testing was planned to take place in diverse settings where space and resources might be limited or not ideal due to the nature of the populations of dogs (i.e. shelter dogs and long-term owned dogs). After completion of the second phase of piloting, slight additional adjustments were made. The performance of the dogs in both phases of piloting

varied considerably in each test, thereby suggesting the potential of the instruments to discriminate individuals.

After this second phase of piloting, a change in the initial planned methodology for this study was decided upon: to add a citizen science component for data collection. Once this change in methodology was decided upon, it was determined that further alterations to testing materials were needed. Of particular concern was the equipment necessary for the L-shaped food finding test. A purpose-built structure was originally constructed to be used in this test. The structure was approximately four meters^2 with opaque sides and two openings on opposites sides through which the dog can exit. It was the same layout as the final version used for testing, in which chairs covered with bed sheets or large towels were used in lieu of the sides of the purpose-build structure. It was determined after initial piloting with the structure that feasibility of administration would be increased by instead using items that could be easily sourced (e.g. chairs and towels), so the structure was not taken forward. All other testing materials remained the same (e.g. dog bowl, dog treats, baby gate or removal panel from a dog crate). Once an alternate set-up was configured for the L-shaped food finding test and other minor modifications were made to administration of the other three tests, a third and final phase of piloting was necessary to specifically assess the comprehensibility and feasibility for the samples tested by a citizen science approach. A small panel of individuals who are dog owners and/or are familiar with working in a shelter/rehoming organisation setting were recruited for this purpose. They were asked to provide feedback on both the comprehensibility and feasibility of the testing process, which collectively indicated that only very minor alterations to the instructions were necessary for clarification purposes.

Appendix P

Informed consent by dog rehoming organization for canine participation

I, (your name)_____, confirm that I am over 18 years old and hereby give consent to participate in the study entitled, "The Role of Behavioural Flexibility in the Success of Shelter Dog Rehoming" being conducted by Karen Griffin, approved by the relevant ethics committee of The University of Lincoln. I am participating on behalf of (name of dog rehoming organization)_____. I also give consent for the dogs who are currently part of the organization to participate in the aforementioned study. I confirm that these dogs are not owned by an individual and need to be rehomed.

The purpose of this study is to examine factors that affect the success of shelter dog placements. In order to do this, a battery of four tests have been developed for dog assessment. The tests are game or puzzle-like in nature (e.g. playing with toys, finding treats, etc.). They are non-invasive and should not cause significant physical or psychological harm to dog or human participants. If you are concerned at any point about a participating dog's wellbeing you should stop immediately and not persist, but please do notify Karen Griffin (kgriffin@lincoln.ac.uk) so that any potential adverse events can be monitored. The practical application of this project is to use the results of the research to develop a standardized, easily administrable method to be used in the rehoming process to assess dogs prior to adoption in order to maximize the likelihood of a successful dog-adopter pairing. Your contribution to this study is invaluable to the success of this project and will potentially allow future dogs to be rehomed more successfully.

I understand that my role in the study at this time will be: to use the battery of tests to assess the dogs referenced above while closely following the instructions for administration provided for the tests, and to complete the "Testing Questionnaire" and the "Rehoming Organization Dog Information Gathering Form" for every dog tested. I will try to complete these forms as and when requested. If it is applicable, I understand that I will receive testing kits, which will include some but not all required testing supplies. These items (e.g. dog toys and treats) are being donated to participating applicable organizations, and thus may be kept and do not need to be returned after the completion of the tests.

I am freely supplying information about myself and the participating dogs, and my contact information including postal address, phone number, and email address for this purpose and agree to be contacted by the researchers involved in this project accordingly.

I understand that my personal data and the rehoming organization's data will be anonymized once it has been collected and neither I nor the organization will be identified or identifiable in any publication resulting from the work. All data will be stored in accordance with the UK Data Protection Act and associated requirements. I understand that should I have any questions or concerns about the study now or at any point in the future I may contact the principal investigator, Karen Griffin: kgriffin@lincoln.ac.uk.

I will follow the principal investigator's instructions to the best of my ability, but I am aware that I have the right to withdraw myself, the rehoming organization, and the participating dogs from the study at any time prior to the completion of data collection without giving notice or reason.

I agree that data collected from the responses that I have supplied can be used for academic purposes as deemed appropriate by Karen Griffin and the other contributors involved in this study.

Date_____

Full name_____

Signature_____

Appendix Q

Rehoming organization dog information gathering form

The organization and the tester:

1. What is the name of the shelter / rehoming organization / rescue centre that you work or volunteer for?_____

2. If the organization has a website, what is the web address?_____

3. In what country is the organization located?_____

4. What is your date of birth (dd/mm/yy)?_____

5. What is the your email address or the organization's email address? **Please ensure you provide the same email address whenever requested in this study.**_____

6. Are you the primary caregiver or one of the primary caregivers of the dog (e.g. responsible for dog maintenance the majority of the time)?
   ☐ Yes
   ☐ No

The dog:

7. What is the dog's name?_____

8. How long has the dog been part of your organization (please be as precise as possible)?
   ____days
   ____months
   ____years

9. From where did the dog come prior to arriving at your organization?
   ☐ Stray
   ☐ Owner surrender
   ☐ Transfer from another organization (e.g. municipal shelter)
   ☐ Born in shelter
   ☐ Seized as part of animal cruelty case
   ☐ Other_____

10. What is the current age or estimated age of the dog (please be as precise as possible)?
    ____months
    ____years

11. Is the dog's age known or is it an estimate?
    ☐ Known
    ☐ Estimate

12. What is the sex of the dog?
    ☐ Neutered male ☐ Intact male
    ☐ Spayed female ☐ Intact female

13. How much does the dog currently weigh?
    ☐ Up to 25 lbs. (11 kg)
    ☐ 26-60 lbs. (12-27 kg)
    ☐ 61-100 lbs. (28-45 kg)

☐ 101 lbs. (46 kg) or more

14. Has the dog been previously adopted and returned to the organization?
☐ Yes
☐ No
☐ Unknown

Appendix R

Informed consent by dog owners for canine participation

I, (your name)_____, confirm that I am over 18 years old and hereby give consent to participate in the study entitled, "The Role of Behavioural Flexibility in the Success of Shelter Dog Rehoming" being conducted by Karen Griffin, approved by the relevant ethics committee of The University of Lincoln. I also give consent for my dog, (dog's name)-_____, to participate in the aforementioned study. I confirm that I have owned this dog for a minimum of three years, that I have lived in the same household as him/her for the majority of the time I have owned him, and that I was at least 18 years old when I acquired him/her.

The purpose of this study is to examine factors that affect the success of shelter dog placements. In order to do this, a battery of four tests have been developed for dog assessment. The tests are game or puzzle-like in nature (e.g. playing with toys, finding treats, etc.). They are non-invasive and should not cause significant physical or psychological harm to canine or human participants. If you are concerned at any point about your dog's wellbeing you should stop immediately and not persist, but please do notify Karen Griffin (kgriffin@lincoln.ac.uk) so that any adverse events can be recorded. The practical application of this project is to use the results of the research to develop a standardized, easily administrable method to be used in the rehoming process to assess dogs prior to adoption in order to maximize the likelihood of a successful dog-adopter pairing. Your contribution to this study is invaluable to the success of this project and will allow future dogs to be rehomed more successfully.

I understand that my role in the study at this time will be: to use the battery of tests to assess the dog named above while closely following the instructions for administration provided for the tests, and to complete the "Testing Questionnaire" and the "Owned Dog Information Gathering Form". I will try to complete these forms as and when requested. I understand that will be contacted in one month and will be asked to complete this process a second time in the specified timeframe.

I am freely supplying information about myself and my dog, and my contact information including postal address, phone number, and email address for this purpose and agree to be contacted by the researchers involved in this project accordingly. Karen Griffin will contact me in one month with further instruction for re-administration of the battery of tests.

I understand that my personal data will be anonymized once it has been collected and I will not be identified or identifiable in any publication resulting from the work. All data will be stored in accordance with the UK Data Protection Act and associated requirements. I understand that should I have any questions or concerns about the study now or at any point in the future I may contact the principal investigator, Karen Griffin: kgriffin@lincoln.ac.uk.

I will follow the principal investigator's instructions to the best of my ability, but I am aware that I have the right to withdraw myself and my dog from the study at any time without giving notice or reason.

I agree that data collected from the responses that I have supplied can be used for academic purposes as deemed appropriate by Karen Griffin and the other contributors involved in this study.

Date_____

Full name_____

Signature_____

Appendix S

Long-term owned dog information gathering form

*If you are testing more than one dog, please complete a separate form for each dog.

The owner:

1. In what country do you reside?

2. What is your date of birth (day/month/year)? / /

3. What is your email address? **Please ensure you provide the same email address whenever requested in this study.**

4. Are you the primary caregiver of your dog (i.e. responsible for dog maintenance the majority of the time)?
   ☐ Yes
   ☐ No

5. Do you live in the same household as your dog?
   ☐ Yes
   ☐ No

6. For how long have you owned your dog (please be as precise as possible)?
   years months

The dog:

7. What is your dog's name?

8. What is the current age or estimated age of your dog (please be as precise as possible)?
   years months

9. Is your dog's age known or is it an estimate?
   ☐ Known
   ☐ Estimate

10. What is the sex of your dog?
    ☐ neutered male ☐ intact male
    ☐ spayed female ☐ intact female

11. How much does your dog currently weigh?
    ☐ up to 25 lbs. (11 kg)
    ☐ 26-60 lbs. (12-27 kg)
    ☐ 61-100 lbs. (28-45 kg)
    ☐ 101 lbs. (46 kg) or more

12. From where did you acquire your dog?
    - ☐ breeder
    - ☐ pet store
    - ☐ rehoming organization / animal shelter / rescue centre
    - ☐ gift from another individual
    - ☐ purchase from another person (e.g. friend, family member, neighbour)
    - ☐ found as stray
    - ☐ other

Appendix T

Written enquiry sent to rehoming organisations for participation in the citizen science sample of dog testing

Hi _____,
Thank you for your ongoing support and participation in my research on dog rehoming. I am now nearing the end of my PhD, and have one final, rather large, study to complete. I am now looking to assess behavioural flexibility in dogs, so for this purpose I have developed a battery of game-like tests. I am applying a citizen science approach to this study, meaning that rehoming organization staff and/or volunteers are being asked to assess dogs needing to be rehomed. There are no qualifying criteria for the dogs (e.g. age, background, size, etc.) in order to participate - all dogs are welcome! I'm also very excited that the Kong Company and Petsafe are very kindly donating supplies needed for the tests (e.g. toys, treats, etc.), which organizations may keep following the tests.

This study requires quite a large number of participants, so if (the organization) would be willing to take part it would be VERY much appreciated! The study involves a battery of four tests, so if not all dogs are able to be assessed on all tests that's absolutely fine. Please follow link below for more information and testing instructions. There is also further information there regarding having testing supplies sent to you.
http://www.thedogrehomingproject.org/get-involved-contribute-to-the-science/work-or-volunteer-in-an-animal-shelter-or-for-a-dog-rescue/want-to-get-the-dogs-in-on-the-fun-while-theyre-waiting-for-a-home/

Please don't hesitate to contact me if you have any questions.

Thank you again.

Best,
Karen Griffin
University of Lincoln
School of Life Sciences
Joseph Banks Laboratories
Lincoln
LN6 7DL

Appendix U

Discriminant function analyses for dog tests

The L-shaped food finding test (Q1, Q2, Q3, Q4, Q5)

Variables in the Analysis

Step		Tolerance	F to Remove	Wilks' Lambda
1	Q2. Does the dog go to the gate at any point during the task?	1.000	12.120	
2	Q2. Does the dog go to the gate at any point during the task?	.965	15.700	.904
	Q1. Does the dog access the food within 30 seconds?	.965	15.147	.900

Variables Not in the Analysis

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	Q1. Does the dog access the food within 30 seconds?	1.000	1.000	11.579	.904
	Q2. Does the dog go to the gate at any point during the task?	1.000	1.000	12.120	.900
	Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task?	1.000	1.000	7.284	.937
	Q4. Does the dog look at the tester at any point during the task?	1.000	1.000	.125	.999

	Q5. Does the dog exit and then re-enter the testing area before getting to the food?	1.000	1.000	.591	.995
1	Q1. Does the dog access the food within 30 seconds?	.965	.965	15.147	.789
	Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task?	.780	.780	1.298	.889
	Q4. Does the dog look at the tester at any point during the task?	.978	.978	.023	.900
	Q5. Does the dog exit and then re-enter the testing area before getting to the food?	.954	.954	2.143	.882
2	Q3. Does the dog orient toward (i.e. head facing) or glance at the food while in the testing area enclosure at any point during the task?	.760	.760	2.748	.769
	Q4. Does the dog look at the tester at any point during the task?	.976	.943	.100	.789
	Q5. Does the dog exit and then re-enter the testing area before getting to the food?	.952	.920	2.307	.773

Classification Results

			Predicted Group Membership		
		Shelter / owned - coded	Long-term owned	Shelter	Total
Original	Count	Long-term owned	40	8	48
		Shelter	30	33	63
	%	Long-term owned	83.3	16.7	100.0
		Shelter	47.6	52.4	100.0

The Time alone test (Q1, Q8, Q11)

Variables in the Analysis

Step	Tolerance	F to Remove

1	Q8. Does the dog approach/greet tester when they re-enter room?	1.000	7.062

Variables Not in the Analysis

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	Q1. Does the dog explore the room immediately upon entering it?	1.000	1.000	3.679	.962
	Q8. Does the dog approach/greet tester when they re-enter room?	1.000	1.000	7.062	.929
	Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room?	1.000	1.000	.561	.994
1	Q1. Does the dog explore the room immediately upon entering it?	.976	.976	2.141	.907
	Q11. Does the dog orient toward (i.e. head facing) or glance at the door when the tester is not in the room?	.946	.946	.016	.929

Wilks' Lambda

Step	Number of Variables	Lambda	df1	df2	df3	Exact F	
						Statistic	df1
1	1	.929	1	1	92	7.062	1

Classification Results

			Predicted Group Membership		
		Shelter/owned	Long-term owned	Shelter	Total
Original	Count	Long-term owned	9	33	42
		Shelter	10	61	71
	%	Long-term owned	21.4	78.6	100.0
		Shelter	14.1	85.9	100.0

The Pointing test (Q1, Q3, Q5, Q7, Q9, Q11, Q13, Q15, Q17)

Variables in the Analysis

Step		Tolerance	F to Remove
1	Q15. What cup does the dog choose first? (phase 3)	1.000	13.037

Variables Not in the Analysis

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	Q1. Once the dog is let off lead, does he/she approach the cups? (phase 1)	1.000	1.000	.274	.983
	Q3. What cup does the dog choose first? (phase 1)	1.000	1.000	.241	.985
	Q5. Does the dog then investigate another cup even if they located the correct cup first? (phase 1)	1.000	1.000	1.210	.930
	Q7. Once the dog is let off lead, does he/she approach the cups? (phase 2)	.000	.000	.	.
	Q9. What cup does the dog choose first? (phase 2)	1.000	1.000	.000	1.000
	Q11. Does the dog then investigate another cup even if they located the correct cup first? (phase 2)	1.000	1.000	.144	.991
	Q13. Once the dog is let off lead, does he/she approach the cups? (phase 3)	1.000	1.000	.274	.983
	Q15. What cup does the dog choose first? (phase 3)	1.000	1.000	13.037	.551
	Q17. Does the dog then investigate another cup even if they located the correct cup first? (phase 3)	1.000	1.000	.241	.985
1	Q1. Once the dog is let off lead, does he/she approach the cups? (phase 1)	.979	.979	.000	.551

Q3. What cup does the dog choose first? (phase 1)	.913	.913	.186	.544
Q5. Does the dog then investigate another cup even if they located the correct cup first? (phase 1)	.948	.948	2.020	.486
Q7. Once the dog is let off lead, does he/she approach the cups? (phase 2)	.000	.000	.	.
Q9. What cup does the dog choose first? (phase 2)	.788	.788	1.813	.492
Q11. Does the dog then investigate another cup even if they located the correct cup first? (phase 2)	.999	.999	.045	.549
Q13. Once the dog is let off lead, does he/she approach the cups? (phase 3)	.979	.979	.000	.551
Q17. Does the dog then investigate another cup even if they located the correct cup first? (phase 3)	.913	.913	.186	.544

Wilks' Lambda

Step	Number of Variables	Lambda	df1	df2	df3	Exact F	
						Statistic	df1
1	1	.551	1	1	16	13.037	1

Classification Results

			Predicted Group Membership		
		Shelter/owned coded	Long-term owned	Shelter	Total
Original	Count	Long-term owned	14	4	18
		Shelter	9	15	24
	%	Long-term owned	77.8	22.2	100.0
		Shelter	37.5	62.5	100.0

The testing battery: the L-shaped food finding test (Q1, Q2) and the Time alone test (Q8)

Variables in the Analysis

Step		Tolerance	F to Remove	Wilks' Lambda
1	L-shape Q1: Does the dog access the food within 30 seconds?	1.000	8.287	
2	L-shape Q1: Does the dog access the food within 30 seconds?	.957	10.914	.937
	L-shape Q2: Does the dog go to the gate at any point during the task?	.957	8.003	.907

Variables Not in the Analysis

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	L-shape Q1: Does the dog access the food within 30 seconds?	1.000	1.000	8.287	.907
	L-shape Q2: Does the dog go to the gate at any point during the task?	1.000	1.000	5.428	.937
	Time alone Q8: Does the dog approach/greet tester when they re-enter room?	1.000	1.000	.506	.994
1	L-shape Q2: Does the dog go to the gate at any point during the task?	.957	.957	8.003	.825
	Time alone Q8: Does the dog approach/greet tester when they re-enter room?	.996	.996	.727	.899
2	Time alone Q8: Approach tester?	.995	.953	.734	.817

Wilks' Lambda

Step	Number of Variables	Lambda	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
1	1	.907	1	1	81	8.287	1	81.000	.005
2	2	.825	2	1	81	8.503	2	80.000	.000

Classification Results

			Predicted Group Membership		
		Shelter/owned coded	Long-term owned	Shelter	Total
Original	Count	Long-term owned	33	7	40
		Shelter	21	22	43
	%	Long-term owned	82.5	17.5	100.0
		Shelter	48.8	51.2	100.0

Long-term owned dogs reclassified by origin: the L-shaped food finding test (Q1, Q2) and the Time alone test (Q8)

(No variables qualified for this analysis.)

Variables Not in the Analysis

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	L-shape Q1: Does the dog access the food within 30 seconds?	1.000	1.000	.384	.990
	L-shape Q2: Does the dog go to the gate at any point during the task?	1.000	1.000	.000	1.000
	Time alone Q8: Does the dog approach/greet tester when they re-enter room?	1.000	1.000	1.267	.968

Long-term owned dogs reclassified by origin: the L-shaped food finding test (Q1, Q2)

(No variables qualified for this analysis.)

Variables Not in the Analysis

Step	Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda

0	L-shape Q1: Does the dog access the food within 30 seconds?	1.000	1.000	.509	.989
	L-shape Q2: Does the dog go to the gate at any point during the task?	1.000	1.000	.007	1.000

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